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THE PRACTICAL TEACHER

MR. HERBERT HAYENS.

SPECIAL FEATURES
OF THE
FEBRUARY NUMBER.

NOTES ON
Our New Educational Magazine:
'The Practical Teacher's' ART MONTHLY.

Illustrated Interviews with well-known Teachers.

EDUCATION DEPARTMENT ON 'READING.'

New Object Lessons and Class Teaching Aids.

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SCIENCE SECTION, EDITOR'S TABLE, &c.

VOL. XVIII. No. 8

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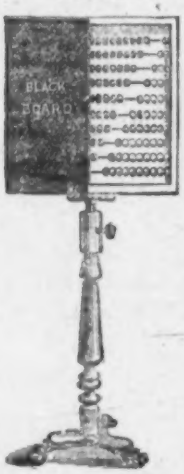

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PRACTICAL TEACHER

A MONTHLY MAGAZINE AND REVIEW

FOR THE SCHOOL-ROOM AND THE STUDY

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Editorial Notes.

IN drawing the attention of our readers to No. 1 of our new Educational Magazine just issued from this office, we take the opportunity once again of warmly thanking the many readers of the PRACTICAL TEACHER at home and abroad for their assistance in making known to their professional friends the merits of this Journal, and for the special contributions which have from time to time appeared in its columns.

* * * * * *

It has ever been our aim to make the PRACTICAL TEACHER invaluable to teachers of all grades throughout the English-Speaking Educational World, and, as recently stated, our success has surpassed our hopes.

* * * * * *

During the past year the number of applications received by us from subscribers all over the country, and from distant parts of the globe, requiring explanations of difficulties in the various branches of teaching, and advice as to courses of study, etc., have been unusually heavy, and far beyond anything ever experienced since the issue of the first number of the PRACTICAL TEACHER in the early eighties.

* * * * * *

We are proud of the confidence thus manifested, and assure our many readers that they may at all times rely on our assistance in any conceivable department of their daily work. Experts in all subjects are attached to the staff of this Journal, and are employed in dealing with difficulties as they reach our Editorial Office.

The recent extension made in our Tutorial Section by the separate issue of a

SCOTCH EDITION OF 'THE PRACTICAL TEACHER,'

containing Tutorial Work to meet the requirements of students preparing for all examinations of the Scotch Education Department, under the able direction of Mr. John Adams, B.A., B.Sc., has, we are glad to say, been successful.

* * * * * *

Our Monthly issues have regularly contained no less than 64 pages of closely printed letterpress. The new special features introduced in these pages during the past two years have met with widespread appreciation, and the success in the way of increased sales has been most gratifying. Had we been able to double the number of pages just mentioned, we fear that this would not have sufficed for the insertion of the numerous contributions available for the benefit of our readers.

* * * * * *

Our Large Object-Lesson Supplements in Tints and in Colours, many of which now decorate the schoolroom walls of our subscribers, and form a useful part of their teaching apparatus, have been made a special feature, and these will be continued from month to month. We have often had the satisfaction of being told by our readers that these Supplements are in themselves **worth more than the price of the Journal.**

* * * * * *

Having achieved so much, we realise all the more clearly how much yet remains to be accomplished; and in order to extend still further the helpfulness of all Sections of this Journal, arrangements will be made, as announced some time since, to meet the needs of **ALL** teachers in their daily work of **CLASS TEACHING,** whether in Boys', Girls', Infants', or Mixed Schools. The foremost Educationists, and Practical Teachers of the ripest experience, have been requisitioned for this work in our columns.

We have received from one of our lady subscribers a letter, in which she asks us whether we cannot give—

> 'An epitome of current events, such as would be of practical use to teachers? I have long felt that while studying and teaching history of the past, I am very deficient in *exact* knowledge regarding recent and current events. Some teachers may be able to wade through the pages of a daily newspaper, but I find it almost an impossibility, at least to do it regularly. Would it be possible to devote a small section of the PRACTICAL TEACHER to this purpose?
>
> 'I have taken in your excellent Magazine for the last nineteen months, and find it most helpful; and I believe such an addition would still further enhance its value in the eyes of many busy teachers.'

Although we have for years supplied this information in some form or other in connection with certain sections and contributions of our Journal, it has never been collated and issued under one heading as our busy correspondent suggests. We have decided to open a page under the heading of—

OUR SEARCH-LIGHT COLUMN:

A Summary of Current Events for Practical Use in Schools.

We shall also make an attempt to rescue from newspapers, reviews, etc., and record in this column many a 'gem' that would otherwise escape the notice of teachers.

* * *

In conclusion, we should like to call the attention of our readers to the first of a series of papers by an experienced inspector of schools, entitled, 'Conferences with Practical Teachers at Inspection.' It is proposed to institute in connection with these papers a correspondence column in order to enable teachers to discuss with one of H.M. Inspectors any points referred to in these papers, bearing upon matters connected with the practical work of school life.

* * * * * *

We now come to our new Educational Magazine, entitled—

'THE PRACTICAL TEACHER'S' ART MONTHLY

(Price Twopence),

of which we present specimen pages. This Magazine is the outcome of the Art Section instituted a short time since in our columns.

* * * * * *

It is not to be understood that the Art Section will disappear from the PRACTICAL TEACHER. We shall continue to give general articles on Art subjects of interest to teachers; and have made arrangements for a second paper on Art Decoration for Schoolroom Walls, which we hope to print in our next issue.

* * * * * *

Owing, however, to the great variety of subjects which may be said to come within the scope of an Art Section, we have felt that greater service could be rendered by more adequate provision in the shape of a separate publication.

* * * * * *

This Monthly will be devoted solely to the consideration of all forms of Drawing and Hand Work which find a place in the curriculum of Elementary and Secondary Schools. Articles written by experienced men and women, thoroughly conversant with the work which they are actually engaged in teaching day by day, will be of a wide-reaching and exhaustive character, embracing the whole range of subjects under the general head of Art and Handicraft.

* * *

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VISITS TO MUSEUMS AND ART GALLERIES.
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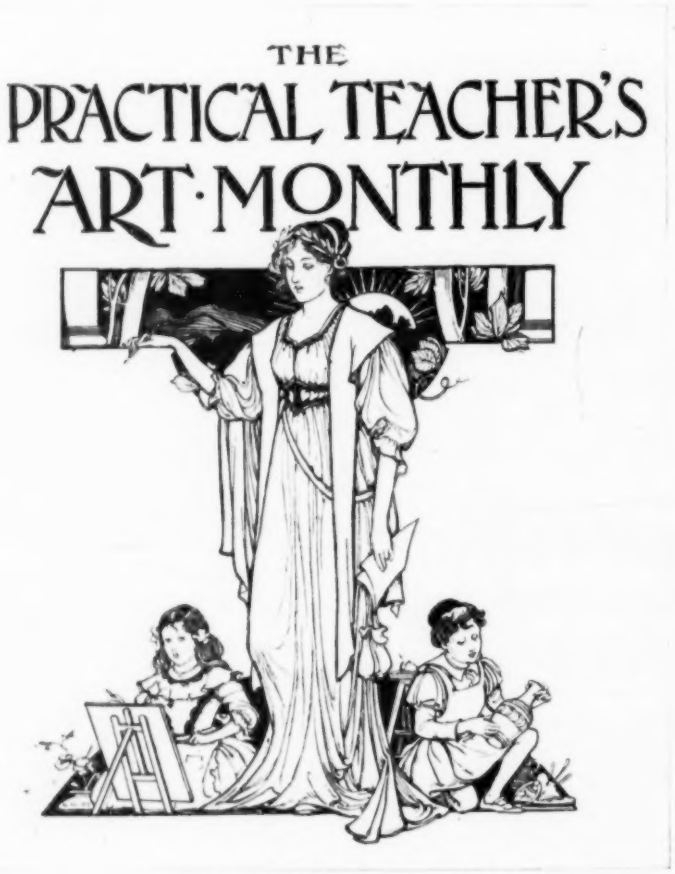
* * *



SMALL SIZE REPRODUCTION OF COVER.

In specially inviting attention to the Prospectus and specimen pages referred to, we may at once say we shall be grateful to all our readers if they will make our new venture as widely known as possible among their friends.

* * * * * *

By a continuance of the encouragement and co-operation of our readers, we hope to make the new Magazine indispensable in every School in the land.

FOR NEW YEAR'S GIFT

TO ANNUAL SUBSCRIBERS TO THE

'PRACTICAL TEACHERS' ART MONTHLY

See Subscription Form Enclosed.

COMING MEN.

MR. HERBERT HAYENS, *Author.*

Late Head Master of Parson's Endowed School, Dudley.

IN many countries, France and the United States of America especially, it is no uncommon matter to find the ex-schoolmaster at the head of affairs, political, mercantile, literary or what not, and here in England, albeit that such cases are not so common, the dictum, 'once a teacher always a teacher,' does not hold. Indeed a most interesting book could be compiled by getting together the histories of such masters and mistresses as have found salvation outside the pale of their profession. Very pleasant it is to note the unwavering sympathy that these ex-knights and dames of the chalk and duster exhibit towards those of their fellows whose fate it is to continue the strife against ignorance, dullness, and moral weakness for the term of their natural lives. It is not long since Zangwill, the eminent novelist and critic, remembering school experiences of his salad days, vicariously took up the cudgels for the London Board Class Teachers in the columns of one of the dailies, and many are the instances where the sympathetic word of the ex-teacher causes a proper regard for his erstwhile fellow in arms to take the place of a prejudiced lack of consideration. It is just and fitting then to enrol the ex-teacher amongst the very best friends of the existing teacher, who in his turn will watch with interest and applause the successful career of the emancipated one. To speak of Mr. Herbert Hayens as an ex-teacher is to be intensely up to date, since he only 'laid down his tools' at the Christmas breaking up of his school. To describe him as a Coming Man is also somewhat beside the mark, seeing that he has already 'arrived' as a successful teacher, and also as a no less successful writer of books for our boys, both of smaller and of larger growth. Still our defence will satisfy both our readers and our subject, for by our use of the term we simply wish to express our conviction that the meed of success so far attained to by Mr. Hayens is simply an earnest of the far greater measure of successful accomplishment which the womb of the future has in store for him. But you, gentle reader, are eager for particulars concerning the life and work of our Coming Man, so now for the plunge *in medias res.*

MR. HERBERT HAYENS.

Thirty-seven years agone, as the novelists put it, viz., on the 13th January 1861, Mr. Hayens was born in Bristol city, his father being a captain in the mercantile marine. He was educated at Queen Elizabeth's Hospital, and in the fulness of time was apprenticed as a pupil teacher to the Bristol School Board at Barton Hill Board School, under Mr. Henry Gay.

His period of apprenticeship being finished, Mr. Hayens went to assist the late Mr. John Langdon at Ashton Gate, whence he migrated to Mina Road under Mr. H. J. White, the well-known and deservedly respected member of the Executive of the N.U.T.

Independently trained teachers will rejoice to claim so worthy a representative of the teaching profession as their own, which they may legitimately do, as Mr. Hayens took Second Year's Papers as an acting teacher in December 1882. Two years later he married Miss Jeanie Douglas Cochrane, who also hailed from the great West of England port. The same year saw Mr. Hayens 'set up for master of a school,' the place being North Kyme, Lincolnshire, the time the merry month of June.

For nine years the future author knew the joys and sorrows of a rural life, and well he played his part, obtaining—as the pretty little personal pars in the country papers have it—the highest grants and best of good reports. The country master must perforce study Agriculture, and upon obtaining his First Class Advanced from South Kensington, we find him drawing up a scheme of instruction in Agriculture suited to the needs and capacities of his children, who were duly instructed, and that successfully, in the mysteries of Agriculture, as set out in the Hayens' Scheme. This was a bit of pioneer work that redounded to the credit of Rusticus, and which has borne much fruit elsewhere.

Such a *beau sabreur* of the educational arena could not be other than a stauch unionist, so that it will surprise none, and please all, to learn that Mr. Hayens was one of the fathers of the Sleaford Association of the National Union of Teachers.

The scene now changes to Dudley, the pride of the Black Country, with its Silurian strata and its grand old romantic castle, on whose heights we trow Mr. Hayens has been wont, many times and oft, to chew the cud of sweet and bitter fancy, for literature has its burdens as well as its balm. But this is somewhat beside the mark, so *revenons à nos moutons*, or *Quien sabe*, as Mr. Hayens' heroes of the 'Lone Star' and the 'British Legion' so delight in ejaculating, the soulless editor may delete the erring lines.

It was to Parsons' Endowed School that Mr. Hayens went as head master, upon leaving North Kyme in the spring time of 1893. This was a non-Government school, always working, however, to the Government Code, and examined during the first two years of Mr. Hayen's *régime* by the Government Inspector. There does not seem anything so far to account for what Mr. Hayens is pleased to call his scribbling; but we learn from the subject of our sketch that if he did not, like Pope,

'Lisp in numbers, for the numbers came,'

he was early in the field, and the goddess of poetry was the Muse whom he thus early wooed, with what success himself beareth witness, for quoth he 'my stock of verses is seriously diminishing owing to an increasing demand for pipe lights.'

But in 1889 the struggle began in real earnest, articles and short stories for newspapers and periodicals being written and accepted, amongst others by the *Weekly Dispatch*, the London *Weekly Times and Echo*, the *Bristol Times and Mirror*, the *Bristol Observer*, the *Family Herald*, *Household Words*, and *Tinsley's Magazine*. In addition Mr. Hayens wrote what he terms 'the usual complement of novelties,' which found a ready sale. And now he found his *métier*. During the Christmas Holidays the writer of this sketch has read the five historical romances, by the writing of which Mr. Hayens has put Young England under a weighty obligation to him. These are (1) **The Lone Star,** (2) **Cleveley Sahib,** (3) **Paris at Bay,** (4) **The British Legion**, (5) **The Emperors' Doom,** all of which. except 'Paris at Bay' (Blackie & Son), are published by T. Nelson and Sons, of 35 and 36, Paternoster Row. The books are brimful of interest alike for youth and adult, and it is not necessary, after having perused them, to ask what Mr. Hayens' *forte* is. He is an historical romancer who is destined to run closely such doughty champions as Henty, Kingston, and Ballantyne as a writer of boys' books. Mr. Hayens informs us that he has always been partial to the romance of history, and has aimed at making himself a master of this important branch of literature. His object is to give **useful geography, accurate history, a healthy tone, plenty of excitement,** and, above all, **sound moral teaching unobtrusively administered.** Although, as Mr. Hayens modestly suggests, ideals very often go astray during their conversion into realities, we are simply echoing the words of such reliable critics as the *Academy*, the *Spectator*, and the *Standard* when we say that Mr. Hayens has succeeded in the realisation of his ideal in an eminent degree.

In the coming season we are to have another taste of Mr. Hayens' quality in the shape of 'A Story of Venezuelan Independence,' the chief character in which will be the famous

Bolivar, whose deeds will bring the much-desired thrill through the being of the reader. We have not seen the MS., but we are informed that the new-comer is to be the best of Mr. Hayen's books, if which be true, then will its quality be sterling indeed. The book is to be published by Messrs. T. Nelson & Sons, and our readers will do well to ask for it when next making out their Prize Book requisition. Still later will appear 'A Captain of Irregulars,' which will deal with the Emancipation of Chili. This also is to be published by Messrs. Nelson.

It speaks well for the physique of Mr. Hayens, as well as for his perseverance and wealth of imagination, that he should have been able to accomplish so much, and at the same time maintain his school at the high level of efficiency that has always been its characteristic. What may he not hope to achieve now that the cares and worries inseparable from school keeping, under the best of conditions, are a thing of the past? From Dudley Mr. Hayens passes to Southampton, at which port he will find ready to hand much valuable material which will, we believe and hope, be woven into many a stirring romance to the mutual benefit of both author and reader.

The *Dudley Herald* informs us that Mr. Hayens was not allowed to depart from the midst of the Black Country without the meed of some remembering gift, for after a tea given by the trustees to Mr. and Mrs. Hayens on Friday, December 17th, 1897, a handsome table kettle, suitably inscribed, was presented to the leaving master and mistress in the names of past and present scholars and trustees of the school, who wished to emphasise their sense of the worth of the teachers and the excellence of their work,

Mr. Hayens' change of occupation will carry with it no change of sentiment, so far as concerns his regard for all that appertains to the school. It is not that he loves the school less, but that he loves literature the more, and above all he is anxious to write under more favourable conditions than obtain with a tired brain after a day's fag in school. All our readers will, we are sure, join with us in wishing hearty success to Mr. Hayens in his not altogether new sphere.

One or two curious circumstances need be noted, and first the fact that Mr. Hayens' books smack strongly of the military, so one would have thought that the author, if not a soldier, must at least have close military associations or surroundings. So far from this being the case, his father, as above mentioned, was a sailor, and so have been his forbears for generations back, so that perhaps when Mr. Hayens has tired of 'doting on the milingtary' he may turn to the sea and give us some stirring tales of the mighty main. Next we would draw attention to an unsolicited testimonial from one of the filibusterers whose doughty deeds have so well been related by Mr. Hayens. The letter is as follows:—

Jan. 5th, 1895.

DEAR SIR,—Being attracted by a critique in one of the papers on your book 'The Lone Star,' I bought and read it to see how far it went as to actual facts. I was out on the expedition, and at the evacuation of Granada and burning of the pier, etc., and at the subsequent siege of Rivas, but since that time have never met a single man who was actually on the fighting expedition. I should be glad to know where you got your facts from, as believing I might have a chance of meeting an old chum, I wrote to Nelson's and they sent me your address.

Do you know any Englishman who went out there from New Orleans under the assumed name of Camoens? I saw him last in Costa Rica. Camoens should be now about 65 years of age, and *I should not wonder if you were he.*'

As Mr. Hayens has somewhere about half the years of the redoubtable Camoens, the somewhat confident suggestion contained in the tail of the letter is not a bad joke. Evidently to this old filibusterer Mr. Hayens' plain unvarnished tale savoured strongly of *vraisemblance*, and we question whether anything so unique in the way of tribute to accuracy of description has fallen to the lot of many workers in the field of historical romance. One cannot but regret that this old fire-eater should be without a chum with whom he might, on occasion, fight his battles over again, and we leave the subject in the hope that the lost Camoens may yet be discovered by his quondam comrade in arms.

And now we must take our leave of our Coming Man, having satisfied our readers' curiosity with respect to his goings and comings, sayings and doings, at the same time registering the vow that we will make his acquaintance again when Messrs. Nelson shall permit Bolivar and his co-mates in securing Venezuelan Independence, and the Captain of Irregulars, who evidently was largely responsible for the Emancipation of Chili, to make their respective bows to the public which owes so much to the author of the being of such charming personalities as are to be found in Mr. Hayens' roll of heroes.

THE EDUCATION DEPARTMENT ON 'READING.'

CONSIDERABLY more than a century ago Thomas Sheridan published his treatises on 'The Art of Reading' and 'The Art of Speaking,' and in his preface addressed himself particularly to the clergy and to 'All masters and mistresses of Academies and Boarding Schools.' He calls attention to the general neglect of the subject of Reading, the teaching of which 'usually fell to the lot of old women or men of mean capacities'; he laments the wretched delivery of the best scholars, who

> 'often could not make themselves understood in repeating their own exercises, or disgraced beautiful composition by an ungracious delivery.'

He informs the clergy that there is a

> 'general clamour against the very bad manner in which the service of the Church is too often administered.'

But within the last half-century the study of phonetics has received great attention. Beginning in Germany, the subject was taken up with great enthusiasm and ability by Professor Max Müller and Mr. A. J. Ellis, and a great impetus given to the subject by the publication in 1867 of Mr. Bell's 'Visible Speech,' so that to-day separate symbols have been assigned to every appreciable variation of sound in the Aryan languages of Europe, and phonetics are recognised as the indispensable foundation of all study of language. Systematic instruction in voice cultivation has, however, been almost exclusively devoted, both in books and in teaching, to the *Singing*-voice rather than to the *Speaking*-voice; and the profession of training the latter can hardly yet be said to be fully recognised. Despite, however, the great attention given to this subject, we find, two years ago, Canon Fleming issuing a book 'On the Art of Reading and Speaking,' which, like Sheridan's work, was addressed mainly to the clergy. It appears, therefore, quite manifest that defective articulation and slovenly speech and reading are by no means the monopoly of those who are educated in the elementary school. But as primary education is at present alone subject to Government Reports, the appearance of such circulars as those recently issued by the Education Department is followed by a public outcry. Thus, on the 17th ult., the *Times* contained a 'leader' which took as its text a passage in the circular to H.M. Inspectors:—

> 'It is generally admitted that the reading in schools and the teaching of reading are unsatisfactory.'

The writer entirely approves of the circulars, and says—

> 'It is not a little significant that at this time of the educational day it should be found necessary solemnly to instruct training colleges and pupil teacher centres in the elementary principles of good reading.'

Such an observation is pardonable on the part of those who do not know the facts; but the truth is that the teachers at these places have the unenviable task of attempting to eradicate, in lessons amounting in the aggregate to two hours a week, evil habits of speech that have taken from 15 to 25 years to develop. But is this 'slipshod indistinctness of utterance' restricted to the child educated in a primary school? The lads of our Public Schools and the young men of our Universities mispronounce their vowels, though in a different way, quite as much as average children from elementary schools. While the latter *may* speak of a 'news-piper,' the former would probably call a Highland piper a 'Hayland paper'; but we call the former 'vulgarity,' the latter 'culture,' or, as

we heard recently, 'high English.' The truth is, the fashion of the day is to speak in a voice thin and devoid of all richness, and the recommendation to produce the vowels *ore rotundo* (to use the words of the circular) is more frequently 'honoured in the breach than in the observance' by all classes of persons.

We have no desire to defend the indefensible, nor to be content with a *tu quoque* answer to the critics of elementary education, but fairness demands that attention should be called to the very general prevalence of the evils to which these circulars very properly and opportunely refer.

For several years H. E. Oakley, Esq., H.M. Inspector of Training Colleges, has been advocating the introduction into the colleges of systematic exercises in voice-production, and the circular addressed to the training colleges and pupil teacher centres embodies and emphasises the suggestions which that gentleman has made.

The circular urges on teachers the importance of cultivating the speaking-voice on the following grounds :—

> '1. A teacher cannot teach well unless easily understood. Distinctness of utterance implies audibility, and easy and pleasant sounding speech secures the attention of those whom shouting and stridency distract and tire.
>
> '2. Good reading is an exercise in voice-economy, and voice-economy is useful in all degrees. It is always a saving of physical effort; at the least it is a protection against common forms of throat disease, to which those who live by talking are prone; and at the best it is an admirable and health-giving gymnastic. It is a most painful fact that a substantial number of our teachers suffer from more or less developed and recognisable forms of throat disease, which a little exact knowledge and careful practice in the earlier stages might have cured, if not avoided. And experiments have satisfactorily shown that even in cases of advanced deterioration, carefully graduated exercises have gone far to mitigate the mischief already done.
>
> '3. The best reading is evidence of many good physical and mental qualities, which are capable of cultivation, though rarely communicable by mere pattern-giving.'

Most or all of this will be generally accepted. My Lords then recommend the teachers of reading in the colleges to obtain instruction from voice specialists,

> 'in order that they may select from the exercises set, those which they know will be useful to their own pupils.'

Will these Professors of Voice-cultivation knowingly communicate to trained teachers that special information by which the former earn their livelihood? How is the teacher who is not aware of any vocal defect to approach these specialists? Let us hope that these gentlemen will be found to possess a broad public spirit. My Lords next set forth the 'ordinary stages of teaching' the subject, which may be summarised as follows :—

> '1. Get students to recognise the value of (*a*) easy audibility, and (*b*) voice-economy.
>
> '2. Deal with idiosyncrasies and provincialisms.
>
> '3. Devise carefully graduated exercises in breathing and controlling generally the organs of speech.
>
> '4. Give drill in each vowel and consonant; compare allied sounds in another language—French by preference. Pay particular attention to final consonants.
>
> '5. Combined practice in these particulars. Reading unpointed passages, etc.
>
> 'If the reader comprehends the relations of the constituent clauses of a sentence, and the relations of the constituent sentences in a paragraph, has a fairly flexible voice properly used, and is encouraged to render the passage in phrases produced distinctly, as it would be naturally spoken when meant to serve as information, the instructor can at this stage do little more.'

The circular takes a very peculiar view of recitation :—

> '*If well taught*, it serves as a chart or compendium of the points which the pupil must observe in order to acquire the power of easily audible and acceptable speech.'

This probably means that, in the teaching of the recitation the instructor will have dealt with almost every difficulty likely to arise in teaching reading, and that, associated with the passage learnt, will be the recollection of the instructions and methods devised or employed by the teacher.

We are pleased to note that very declamatory emphasis in recitation is discouraged.

There is one point in this circular which we trust will be productive of much good; we refer to the attention that is drawn to the almost complete neglect of reading at the pupil teacher centres :—

> 'In most centres pupils are *heard to read*, but are not often *taught reading*; and in the preparation of the passage to be recited before H.M.I. they are mostly left to their own devices altogether.'

If this be true, no wonder the difficulty is so great in the training colleges; for every year of delay makes the work of eradicating bad habits of speech and forming new ones infinitely more difficult.

Without entering into the question whether my Lords have not exceeded their province in attempting to teach the teacher how to teach, we feel that continuous and systematic teaching in reading throughout the whole of the teacher's training must be productive of excellent results, and will remove the possibility of such a reproach as that quoted from the *Times* above.

Seeing that so many of Her Majesty's Inspectors are not trained teachers, it is not surprising that my Lords should have thought it advisable to issue a circular to them indicating what points to look for in good reading, and that, while deploring the unsatisfactory character of reading in primary schools, they should have intimated what they considered to be the causes of the evil complained of. But we may deeply pity the poor Inspectors who hope to derive much definite instruction from Circular 407.

It is apparent from the opening paragraph that the Inspectors have held very different views as to the meaning of the phrase in the Code, 'reading with intelligence.' Some have taken it to mean that the children were to be able to stand an examination on the subject matter, and on the meanings of the words in the passage read. But the circular makes it clear that my Lords meant 'intelligent expression,' which is defined as

> 'such modulation of the voice as correctly interprets the meaning of a writer for a hearer.'

This error on the part of H.M. Inspectors is largely accountable for the

> 'confusion of an Expository or Information Lesson with Practice in Reading aloud,'

which is one of the reasons assigned in the circular for the unsatisfactory condition of reading. Undoubtedly the exercises in enunciation, modulation, expression, etc., should not be interlarded with explanations of reading matter. The suggestion to divide the time for the reading lesson into two parts, in the first of which anything necessary to an adequate appreciation of the passage is explained, and, in the second, the time is spent in reading exercises, is sound.

'*The largeness of classes, and the presence of many classes in one room*,' is held accountable for the 'harmful, because slovenly, practice of *simultaneous reading*,' which, in turn, is held responsible for 'a slipshod indistinctness of utterance, and the production of a monotonous, or sing-song intonation.'

In the first place it must be recognised that the mere following with the eyes of the passage that another is reading will never produce that excellent reading which these circulars so accurately describe. Suppose a class of 60 children, with one hour per day for reading; each child would in the course of a week have but five minutes' exercise in reading aloud. The teacher, by means of simultaneous reading (by which we mean short passages read after the teacher), is able to instruct and exercise all his class in modulation of the voice, articulation, expression, accurate pronunciation and emphasis, etc.

When will it be recognised that a good teacher is a man of resource, and is never a slave to one system?

The exercise, criticism, and correction of the individual are absolutely necessary, but without a discreet use of simultaneous reading the teaching of reading in elementary schools, where large classes are inevitable, would be far worse than it is.

The next reason assigned is—

> '*A premature and ill-judged regard for expression*: and the consequent neglect of those mechanical parts of the reading exercise which are well within the range of the young pupil's power of achievement.'

Does regard for 'expression' interfere with the mechanical parts of reading? If it does, in the first time of going over the passage by all means disregard expression. But surely modulation and flexibility of the voice are to be cultivated early, and why not let the intelligence work with the voice? Otherwise exercises must be given in which the children are told to emphasise any particular word indicated, a method that would cultivate the voice, but not produce that 'intelligent expression' of which so much is made at the beginning and end of this circular, which finishes with these words :—

> 'There are too few signs in reading aloud of the individuality of expression which we call "*intelligence.*"'

Perhaps the most surprising passage in this circular is the following :—

> 'To cultivate modulation and intonation by setting a short pattern to be imitated is to encourage a kind of hypocrisy that exposes itself in an unprepared passage at once and unmistakably.'

The cue to this passage occurs in the following paragraph, where *short* 'pattern reading' is condemned.

Here, as elsewhere in the circular (and it is its chief merit), my Lords wish to encourage individual effort, and therefore deprecate the teacher reading the passage before the children have tried what they can do with it without help.

There are several other excellent recommendations over and above those which are most obvious, *e.g.*—

> 'Success in securing precision depends on the cultivation of a good habit of speech at all times. Truncated and "woolly" (remarkable epithets) enunciation should be permitted in no circumstances : children should be encouraged to acquire the power of continuous audible speech by the exaction of reasonably long descriptions, résumés of lessons heard, and careful recitation.'
>
> 'A practice full of profit to every member of a class (including the teacher), is to make each in turn read exclusively to the *ears* of his comrades, and not, as is usually the case, to their *eyes* alone.'

This latter recommendation, although open to verbal criticism, is an excellent method of showing the need of distinct utterance.

> 'Children should not usually be asked to read a passage aloud until they have had time to master its general meaning by silent study.'
>
> 'It is a peculiar and marked defect of our common primary school practice to give the children so little at any time and in any subject to "get up" for themselves ; they suffer from lack of what has been been called "a little wholesome neglect."'

In conclusion, we may say that, in the circular to the Inspectors, what is new is mostly not good, and what is good is mostly not new.

We trust, however, that H.M. Inspectors, as well as the teachers, will remember one phrase in this circular, viz.—

> 'Variation in procedure is valuable in every part of the school curriculum.'

We should regret nothing so much as to see my Lords attempting to stereotype school method, and we trust H.M. Inspectors and the teachers of our schools will work hand in hand to bring about the re-discovery of what the pessimist of to-day calls 'The lost art of reading.'

LORD ROBERTS ON ESPRIT-DE-CORPS.—Lord Roberts of Kandahar has just written the following letter to Messrs. Cassell and Company.—'Please accept my best thanks for your letter of the 16th inst., and for the copy of the book entitled 'Scarlet and Blue,' edited by John Farmer, Esq., of Balliol, which you have been good enough to send me. I have been particularly interested in the collection of regimental ballads, which are included in the book, and I feel sure that the whole publication will become popular amongst our soldiers and sailors. It is all important, in my opinion, that *esprit-de-corps* should be encouraged in every possible way, and there is nothing which brings such a feeling to the surface in the minds of Englishmen as recollections of former deeds of heroism and bravery.

WELL-KNOWN TEACHERS AT WORK.

MR. J. F. BLACKER,
Christ Church Schools, Brighton.

If the visitor to 'Breezy Brighton,' walking westward on the magnificent esplanade which stretches for some five miles along the sea-front of that attractive town, goes but three or four minutes past the West Pier he comes to Bedford Square. Let him then turn northwards, and on the right hand of Bedford Place, as he comes within a stone's throw of the famous Western Road, he will see the well-planned but not very conspicuous building known as the Christ Church Higher Grade Schools, which have for more than twenty years been the scene of Mr. J. F. Blacker's professional labours.

As may be seen from our illustration, the part of the building close to the street is lower than the main portion which lies behind it. The lower portion is the original front of the

MR. J. F. BLACKER.

building, and dates from 1841. It contains, besides the main entrance, a reception room, and a managers' meeting room, with a well-stocked school library. The loftier portion forms the school proper, and on its ground-floor affords accommodation for about 180 girls, while the upper story accommodates 180 boys. The infants' department is in another part of the parish nearly a quarter of a mile away.

Making a friendly call on Mr. Blacker in the early part of this winter, we received a kindly welcome, and found this school, though comparatively small, an extremely favourable specimen of the thoroughly well conducted voluntary school, and as such deserving a careful description.

In the first place the building seems to us admirably planned. The girls' school, as we see it, consists of two large rooms almost exactly square, and separated by a wooden partition from floor to ceiling. This partition is constructed on an ingenious principle, and consists of a number of sections about 30 inches wide, each turning very easily on a swivel at the centre of the top and bottom, and then sliding as easily along a groove above and below. Thus the sections can be packed in small space at either side of the single room into which the two are thus quickly thrown. In this room school concerts can be given ; and, as helpful for this purpose, there is at one end a raised platform on which is placed a handsome grand piano, the gift of T. J. Usher Robins, Esq., one of the generous managers. We should add that the school contains another piano for ordinary school use. At the back

of the schoolroom is a well-arranged and well-fitted kitchen in which lessons on cookery are given to the elder girls by a specially qualified teacher. We were pleased to notice that the cooking utensils were of the ordinary useful kind likely to be used in the respectable sort of homes from which the scholars come. The girls' school is under the management of Miss Goldsmith.

We are chiefly concerned, however, with the boys' school which occupies the upper floor, and have only made this brief reference to the girls' department in passing, in order that our account of the building may be fairly complete. The boys' school is differently divided, and consists of three rooms of about equal size, each measuring some thirty feet by twenty feet, and separated by permanent immovable partitions. Each room has a ridged roof of its own, as may be understood from the three gables and triple roof shown in our illustration.

There are several interesting features to be noticed in the rooms themselves. They are in every way eminently adapted to the purposes of school work, being excellently furnished with single desks in the first division, dual desks in the second, and long ones with backs and reversible flaps in the third. On the walls there are no maps nor diagrams—in the school there are plenty of both: but the walls are adorned with artistic pictures, chiefly water-colour, sepia, and pencil drawings. In the second room there are some lovely water-colours selected privately by Mr. Blacker from the works of the students of the National Art Training School. It is remarkable that the two artists who furnish most of the drawings have since obtained high distinction at South Kensington, both being winners of medals. The recent gold medallist, Mr. Thorogood, winner also of the travelling scholarship, is represented by some charming views of out-door life and work. But then Mr. Blacker's hobby is art. He believes in a hobby, and thinks his own is a pleasant and perhaps a profitable one. He dwells with delight on his fine collection of old china, including about sixty Oriental figures and groups, some of them exceedingly quaint and rare, and also on his beautiful prints and pictures.

CHRIST CHURCH SCHOOLS, BRIGHTON.

His first assistant, Mr. Freemantle, has a hobby, too. He has been engaged in the school as long as Mr. Blacker. His speciality is Botany. All through the spring and summer and even later his room bears evidence to his boys of the interest he takes in this study. About 300 specimens of British wild flowers have been displayed in glass jars round the room in the course of the year 1897. The boys help by bringing in such flowers as they gather in their walks on the Downs. 'This mutual co-operation,' says Mr. Blacker, 'does good in many ways.' Our visit is, unfortunately, too late in the year for us to see the living plants round the walls: but we see the stock of glass bottles put away in readiness for use next season; and we see also rows of cards recording the trophies of the past season, each card bearing the common and scientific name of a plant, with the time and place of its collection. Then Mr. Freemantle shows us a very fine collection of preserved flowers, not made at this school, but supplied on his application by Messrs. Cassell & Co. after a recent competition. He also shows us with the delight of an enthusiast a collection of some thirty flowers he gathered on the Downs on the previous Saturday—the last in October. Including, as it did, the viola, the pimpernel, and many summer flowers, this collection afforded striking proof of the exceptional mildness of the season.

Another noticeable feature is that each room has its own museum. 'That in the room of the upper division,' says Mr. Blacker, 'was the lifework of a late Indian judge, and was given to the school by the Rev. R. M. Hawkins, a former incumbent of the neighbouring church, with which the schools are connected. He worked nobly for the schools, and was much appreciated by the teachers.' The little ones have a museum not yet completed. Part of this was very striking. It was a collection to illustrate the purchasing power of a penny, and contained copies of the principal penny newspapers, a penny postage stamp, various toys and many useful articles. Most of these had been brought by the boys themselves.

Among the wall decorations one worthy of mention is a small ornamental frame containing the following reply to a telegram congratulating the Queen on her record reign:—'Balmoral, Sept. 23rd, 1896.—The Queen thanks the staff and school children for their kind message of congratulation.'

The rooms are warmed throughout by hot-water pipes painted a stone colour. The light is abundant, and is well distributed, so that a bright and cheerful appearance pervades the school. For artificial light, the electric is used, and our attention was called to an excellent plan for preventing waste. In each room the switches for all the lights but one are enclosed in a case, of which the head master keeps the key. Thus only one light in each room is at the command of the caretaker.

Mr. Blacker prides himself especially on one feature of his school. It is, as he expresses it, self-contained. Except for the visits of H.M. Inspectors as representing the Education Department, the managers and the teachers have it entirely under their own control. No diocesan Inspector or organising master comes to interfere with the master, who has all along enjoyed the full confidence of the managers. None of the pupils go out of the school for part of their instruction. Manual instruction in woodwork is given by a skilled artisan for two hours every day under a specially approved scheme. The room set apart for this work is at the back of the main rooms, over the cookery kitchen, already mentioned. The benches are strong and in every way suitable for the work, and when not required as benches they are readily convertible into desks. Each has a complete set of tools, which are stored in a separate cupboard. On the walls hang a series of framed designs from the German museums, the gift of a friend of the schools. This manual work is an additional expense, but the desire of the managers is to afford every opportunity for the development of the particular trend of the boy's mind and ability. It is satisfactory to learn that the results have been 'excellent.'

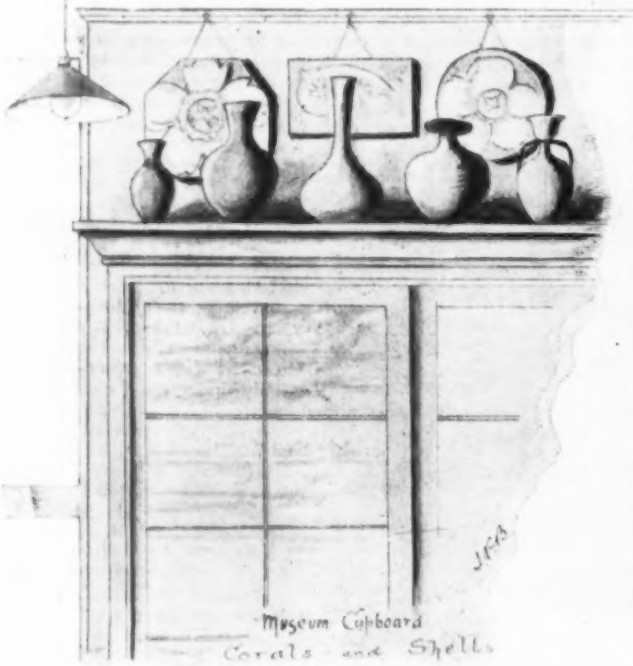
This feature of the school being self-contained is further illustrated in the provision made for commercial education of a special kind. Through the generosity of Mr. T. Usher Robins, one of the managers, a beginning has been made, providing five scholarships of £6 each. This is being expended in providing at the school a special course of instruction in book-keeping, type-writing, and shorthand under a visiting teacher—the specialist in this case being an 'old boy' of the school. Three of the scholarships are held by boys, and two by girls. Each of them receives a gold-centred silver medal, and all the necessary books, and besides pays no school fees.

The mention of fees reminds us that we have not stated the exact nature of the school. It is one of the voluntary schools which really deserves that name; for it is liberally supported

by local contributions. The boys and girls pay 9d. per week each, except such as have been admitted from the distant infant department, for whom the fee is 6d. Nearly half the scholars now attending pay 9d. per week.

We asked Mr. Blacker if they were able under this arrangement to obtain the fee grant, and he answered, 'We do not claim it. When the Government adopted the plan of *Assisted Education* the parents met by invitation. A resolution was moved by one of them and seconded by another, "That the fees remain as at present, and the fee grant be not accepted." A discussion followed, and though a strong speech was made by a canny Scot against the resolution, it was carried by about 200 to 5. Hence, up to the present, no fee grant has been applied for."

This is mentioned by Mr. Blacker as an example of the way in which the wishes of the parents are consulted; and he adds: 'Then the whole work of the school is rendered easy and pleasant because of the mutual confidence existing between parents and teachers for the best welfare of the boys,



A CORNER IN THE SCHOOLROOM.

for whom there is an unusual demand amongst professional men, tradesmen, and others. The age of leaving is rather over the average; some stay till they are 14 or even 15, whilst one or two now at school are over 15 years of age.'

These statements show that the children come from a respectable and rather well-to-do class; and this is amply borne out by the appearance of the boys as we pass through the school. The work we saw during our brief visit also bore witness to intelligence and willing perseverance on the part of the pupils as well as to the energy and ability of the teachers. In the upper division we were shown some maps, very carefully drawn and coloured; and in the lower classes the written work, which was preserved and displayed, was remarkably good.

We asked Mr. Blacker what he did with regard to home lessons, and he said that the boys were set home work, and he had practically no difficulty about this matter. From a table for Division I., we find that arithmetic is set daily, drawing once a week, Map-drawing, Grammar, Physics, and Physiology each on two days a week.

The class subjects taught are Geography in all standards, elementary science in the lower divisions, and English in the upper. Two 'specific' subjects are taught, Physics and Physiology.

Questioned about the boys who leave, Mr. Blacker says: 'There is no difficulty in finding them suitable situations. The demand for them is greater than the supply. Some firms take scarcely any other boys than those from this school. From office boy to manager is no unusual sequence; and this, after all, is a great testimony—perhaps the highest—to the esteem in which the schools are held.'

On the question of subscriptions, our friend remarks, 'The voluntary subscriptions and church collections furnish a large proportion of the income. Last year, owing to the removal of one incumbent, a long interregnum, and then the death of his successor, was a very trying time. The laymen did excellent work, but the funds suffered because of the absence of a clerical head. The newly appointed incumbent has, however, now taken up the work. The subscribers are numerous rather than rich. Many help, and the result has been very satisfactory. Would that all schools called 'voluntary' had such good help!' A wish we heartily re-echo.

Mr. Blacker is proud, and, as it seems to us, with good reason, of the old boys of his school. He says: 'The warm feelings between the boys and their teachers is exemplified by the frequent visits paid to the school by old boys when they return from far-off lands to Brighton. There are also many objects in the Museum which bear witness to this kindly feeling—amongst them a tailor-bird's nest, a fragment from the rock idols of Elephanta, with the ticket of admission, and many others. During the Chili-Peruvian war, a former scholar sent from Iquique, nearly in the middle of the disturbed district, regular accounts of the progress of events. In Monte Video, Canada, Marseilles, India, old Christ Church boys are maintaining the honour of their school. But we need not go so far for examples. The late Alderman Soper, Mayor of Brighton, and the late Alderman Saunders, are local instances of the value of the education given in the old school. Then Mr. Walter Hedgcock, the organist of the Crystal Palace, and Mr. Cuthbert Harris, Mus. Bac., are from the later period. Frank Crook, too, who lately died, to the deep sorrow of many, sang, as a Westminster chorister, the soprano solo before the Queen at the Jubilee service of 1887. He sang his first solo at the age of seven at one of our school examinations. It was "Kyrie Eleison," with chorus by the boys.'

As indicated by an inscription on the front of the building, the Christ Church Schools were established in 1841. In 1891 their Jubilee was celebrated in a very remarkable way in the famous Dome and Corn Exchange, Brighton. Exactly 1,236 old pupils sat down to tea, and afterwards the Dome was crowded with friends invited to take part in the proceedings. Nearly 4,000 were present at this never-to-be-forgotten scene. A concert was given, in which 'all the talent' was furnished by old scholars.

An outcome of this Jubilee gathering was the extension and rebuilding of the schools, and the admirable modern fitting-up which we have already described. 'Amongst the most interesting contributions to the New Building Fund,' says Mr. Blacker, 'were those from past pupils.' He adds that 'the friends of these schools have taken no inconsiderable part in the work done in Sussex since January 21st, 1893, the date of Circular 321—the famous and useful Fabric Circular of Mr. Acland. The sum of £72,785 raised for buildings since that date certainly shows much vitality in the church in this county.'

We seem to have written much of the work done in the Christ Church Schools, but little of the head-master, who with his active energy, his live alertness, is there the motive power that keeps the work going. How great a share he had in the work connected with the rebuilding of his school may be gathered from a statement made by the Rev. R. M. Hawkins, Incumbent of Christ Church, and chairman of the building committee, on the occasion of the reopening in November 1894. His statement concluded thus: 'In the elaboration of this plan they could hardly pay too high a tribute to the patient thought, the careful investigation, the professional skill, the unwearied attention, and the loyal devotion which had marked the labours of Mr. Blacker in that cause which he had made his own.'

We must say a few words as to his professional career. He is a Cornishman. At Truro, and afterwards as a pupil teacher at Plymouth, he was in schools which knew Mr. Greenwood and Mr. Addiscott. He passed into Cheltenham

CHRIST CHURCH SCHOOLS, BRIGHTON.

TIME TABLE.

			RECREATION 10.55 to 11.5.					RECREATION 3.5 to 3.15.						
Days.	—	Class.	9.45 to 10.30.	10.30 to 10.55.	11.5 to 11.30.	11.30 to 12.	—	2 to 2.35.	2.35 to 3.5.	3.15 to 3.45.	3.45 to 4.15	4.15 to 4.45.	—
Monday	Open School at 9.	1	Arithmetic	English	Writing	Physiology	Registers Close 2.15. Prayers 4.45.	Arithmetic	Physics	Drawing	Singing	Spelling, Recit.	Prayers, Home Lessons, and Dismissal.
		2	Arithmetic	Reading	Writing			Arithmetic					
		3	Arithmetic	Reading	Writing	Geography		Arithmetic	Elem. Science	Drawing	Singing	Spelling, Recit.	
		4	Arithmetic	Reading	Writing			Arithmetic					
		5	Arithmetic	Reading	Writing	Elem. Science		Arithmetic	Geography	Singing	Drawing	Spelling, Recit.	
		6	Arithmetic	Reading	Writing			Arithmetic					
Tuesday		1	Arithmetic	Reading	Writing	Physics		Arithmetic	Geography	Physiology	English	Map	
		2	Arithmetic	Reading	Writing			Arithmetic					
		3	Arithmetic	Reading	Writing	Elem. Science		Arithmetic	Writing	Geography	Spelling and Recitation	Mental	
		4	Arithmetic	Reading	Writing			Arithmetic					
		5	Arithmetic	Reading	Writing	Elem. Science		Arithmetic	Writing	Geography		Mental	
		6	Arithmetic	Reading	Writing			Arithmetic					
Wednesday	Religious Instruction to 9.45.	1	Arithmetic	Reading	Writing	Singing		Arithmetic	Dictation	Drawing	Drawing	Map	
		2	Arithmetic	Reading	Writing			Arithmetic					
		3	Arithmetic	Reading	Writing	Singing		Arithmetic	Elem. Science	Drawing	Drawing	Spelling and Recitation	
		4	Arithmetic	Reading	Writing			Arithmetic					
		5	Arithmetic	Reading	Writing	Drawing		Arithmetic	Reading	Singing	Drawing		
		6	Arithmetic	Reading	Writing			Arithmetic					
Thursday	Registers 10.	1	Arithmetic	Reading	Writing	Drawing		Arithmetic	Geography	Physics	English	Map	
		2	Arithmetic	Reading	Writing			Arithmetic					
		3	Arithmetic	Reading	Writing	Drawing		Arithmetic	Writing	Geography	Spelling and Recitation	Mental	
		4	Arithmetic	Reading	Writing			Arithmetic					
		5	Arithmetic	Reading	Writing	Singing		Arithmetic	Writing	Elem. Science		Mental	
		6	Arithmetic	Reading	Writing			Arithmetic					
Friday		1	Arithmetic	English	Writing	Singing		Arithmetic	Physiology	Drawing	Drawing	Spelling and Recitation	
		2	Arithmetic	Reading	Writing			Arithmetic					
		3	Arithmetic	Reading	Writing	Singing		Arithmetic	Elem. Science	Drawing	Drawing		
		4	Arithmetic	Reading	Writing			Arithmetic					
		5	Arithmetic	Reading	Writing	Elem. Science		Arithmetic	Geography	Singing	Drawing	Spelling, Recit.	
		6	Arithmetic	Reading	Writing			Arithmetic					

Training College 6th on the Scholarship list, and won one of the exhibitions. On leaving as on entering the college he occupied the third place. He was specially complimented as having given the best lesson before H.M. Inspector, and was first-class in all his examinations. He holds several science certificates, including two in Honours. For Hygiene he obtained the third place in England, and received a Bronze Medal. From college he went direct to Brighton, where he has since made a reputation for his school and for himself.

The teachers of Brighton, and in more recent years the teachers of the whole country, have known him as an active member of the National Union. He joined the local association a year or so after leaving college. In 1880 he was busy at the first Brighton Conference as Secretary of the Reception Committee. The date of his school examination for some years prevented his attendance at Conference; but when a change of date was made his work became prominent. His action in the 'Baseden Case' started a new and striking policy, since developed, but as yet, Mr. Blacker thinks, only in its infancy. At the Oxford Conference he was elected on the Executive. There he has done much valuable and arduous work, especially in connection with the Law Committee—a work which of necessity is little seen, but is nevertheless of the utmost importance.

The Brighton Conference of 1896, marked as it was by that brilliant scene in the Dome, when the Duke and Duchess of York graced the proceedings at the Reception of Purses for the Teachers' Charities, is still fresh in memory. Mr. Blacker bore with ability and success the honourable but arduous position of Chairman of the Conference Committee. Only the initiated can know how much the success of that great gathering owed to the tact and persistence of Mr. Blacker, as to them only can be known how essential such qualities are in making the arrangements for such important functions.

It is not surprising that Mr. Blacker with such a record should be popular with his fellow teachers. At a dinner which the Brighton teachers gave him at the Royal Pavilion, Mr. Haffenden, proposing the toast 'Our Guest,' described him 'as a man who had always been ready to champion the cause of right against wrong, of the oppressed against the oppressor, and to whom the bare idea of an injustice was like the first scent of battle in the nostrils of the war-horse. They admired him for his courage and his sterling qualities, especially his unselfishness.'

Of the more recent presentation of an illuminated address to Mr. Blacker we need not here speak, as it was noticed soon after in this Journal.

It is not strange that Mr. Blacker, being thus honoured by his professional brethren, should have won the good opinion of his neighbours outside the profession; but that he should with all his other duties find time for local public work does excite some degree of wonder. He has, however, done much work for the people of the town of his adoption. There is no one more desirous to see the beautiful town well and properly governed and growing in attractiveness. He has had a large share during the past two years in forming some eight or nine ratepayers' associations in the various wards, with the object of stirring the burgesses to take an active interest in the municipal business that so intimately affects their interests. As Chairman of the Regency Ward Association he helped to win a notable victory in November 1896, when the unusual proportion of 75 per cent. of the electors recorded their votes. In this way he is helping to bring about a change in the complexion of the Municipal Council, and so to secure a more direct reflection of the ratepayers' views.

He has been pressed to stand as a candidate for the Town Council, but the time of meeting has made it so far impossible for him to consent. And, besides, he gives so much of his life to the work of the National Union of Teachers that he could not undertake new and absorbing public duties without giving up some of those he strives so ably to fulfil for the benefit of the profession which holds the first place in his estimation.

As we leave the school for a stroll along the sea-front, and a talk with our friend on some of the matters we have here put on record, we are led to reflect that in the Christ Church School Brighton possesses a model Voluntary School, in which there is a striking proof that it is not in large institutions that all the best educational work is accomplished.

CONFERENCES WITH PRACTICAL TEACHERS.

BY AN INSPECTOR OF SCHOOLS.

I.

AN inspector finds day by day things that please his official mind and things that displease him. Already one can imagine some of the teachers remarking that it is impossible to try and please every inspector; for while one advises one way another thinks otherwise; and were teachers to endeavour to fall in with the varied suggestions of inspectors, they would be constantly changing their methods and accomplishing little or nothing in the sound instruction of the children.

But we are not going to be angry, though we may express our displeasure at certain faults of teaching that are more common than they ought to be, and now that inspectors and teachers are working under a new and more enlightened system of education, friendly criticism cannot be out of place; indeed criticism must be made by an inspector if he does his work thoroughly.

Teachers must admit that, with all their faults, the inspectors have great opportunities for observing variety of methods; and those teachers who are not well disposed to take hints from an inspector, are unwise in showing resentment when that official freely criticises their school as he is entitled to do under cover of his Departmental instructions.

It should be borne in mind that whether inspectors are good, bad, or indifferent in the eyes of the teachers, there is something to be learnt from men whose daily duties give them such excellent opportunities for self-improvement and for educational knowledge. The writer has met a great many of his colleagues in various parts of the country, and though he has found some difference of opinion on smaller matters connected with school work, he has invariably found perfect agreement on the broad principles of inspection on which the reports of the schools have been based. To put the question plainly, *sense* and *nonsense* are very easily distinguishable, and one regrets to say that a great deal of *nonsense* gets into our school system, the professional errors being more numerous than good teachers can readily imagine.

With the best teachers inspectors as a rule have no difficulty. They need only half a hint to enable them to see that a mistake is being made. It is from these teachers too that the inspectors learn much of their work, for they frequently point out interesting details which improve the inspector's observations or enable him to modify his views.

So much by the way. Let us take up more concrete matter and dispose of it as we go along. An inspector may find, as we have said, an excellent head master or head mistress at a school. This is a great delight, and where such people are met with (and it is a pleasure to say that they are frequently met with) an inspector's official day is happily and instructively spent, and he returns home with a feeling that on that day at least something has been done for the good of the children by friendly conference with some thoughtful educationist.

But this is not always the case. Though most teachers are courteous to an inspector they vary in their reception of his visit, and some have the unlucky knack of showing hostility. They would say that they were not hostile, but fortunately or unfortunately for them their true feelings are betrayed on their countenances, and they would rather see the official at Timbuctoo than in their school—at least on this particular morning. The writer has actually seen a pupil teacher, in sympathy with her mistress making grimaces and looking very awfully annoyed at the official intruder.

A very serious struggle might ensue on these occasions if an inspector also assumed a fighting attitude, but being a man of peace, or appearing to be so, he exercises patience and soon finds that he is not in such hostile quarters as at first might have been supposed. An inspector learns by experience that the suddenness of an official visit often creates a feeling of nervousness which sometimes nonplusses even a very calm and thoughtful teacher. As the day wears on, however, one often succeeds in removing any real or apparent antipathy on the

part of the teachers, and a good day's work is done, although the forebodings appeared ominous.

Well, it is not always an easy matter to give advice under conditions as above described, but a patient and sympathetic spirit on the part of the official can overcome many obstacles, and this remedy must be judiciously applied.

Generally speaking teachers may be classed in two ways. Some have made the new system of inspection their study; they have grasped the idea of the Education Department in making the change; they are no longer fettered in the slightest degree by the old result system; they have risen to the needs of the occasion and rightly expect to receive official recognition for closely studying the actual educational needs of the children.

The second class, it would appear, scarcely trust the Education Department. They give one the idea that they believe Whitehall is not in earnest over the change. The thing is too good to be true, they seem to say, when one reminds them that the old result system is buried. It is not difficult then to see that, in going his rounds, an inspector needs to be very discreet in his criticisms, as he must remember not only the professional faults that it is his duty to remark upon, but the kind of teacher who has to hear his remarks. Some teachers were so much attached to the old system of examination, and had worked so long and successfully under it, that considerable difficulty was experienced in getting them to realise that we are now living in a new educational world. In one of the very best schools in the writer's experience the head mistress actually cried over the change. She looked somewhat sceptically at the inspector while he was describing the new order of things, and then for a short time was quite overcome with grief. Nor was this lady an eccentric teacher. She had nothing to fear, as her school was a model one in many respects. The incident merely shows that there is a great deal of conservatism in education, and that teachers are slow in making changes where for a number of years they have perhaps received high praise for their successful work.

(*To be continued*).

☞ The Writer of these Papers will gladly answer communications from practical teachers in the columns of this paper. These communications, however, should bear directly on the subject-matter under treatment, and any suggestions will be welcomed that will aid teachers in the instruction or organisation of their schools. Friendly discussion between teachers and inspectors can only result in the general advancement of sound, educational ideas. Letters should be marked 'Conferences,' and should be addressed to the Editor of this paper.

INTERNATIONAL CORRESPONDENCE FOR TEACHERS.

LEARNING A LANGUAGE BY LETTER-WRITING.

OUR notes under this heading were omitted from the columns of the Special Holiday Number of this journal, partly on account of the pressure on our space of matter of a seasonable character, and partly because we thought the holiday spirit would reasonably warrant the omission. No doubt the Christmas and New Year's vacations on each side of the Channel had their effect in checking in many cases the flow of correspondence, especially as family re-unions would cause temporary changes of address and add to the difficulties of regular correspondence.

Now that the ordinary duties of a new term have begun, and teachers have settled down to the work of a new year, we do not doubt that our system of International Correspondence will have received a fillip from the good resolutions to which the coming of a new year is apt to give birth. Holiday events and seasonable observances will have furnished material for many letters. On both sides we know some letters have passed which contain very interesting particulars concerning the Christmas customs which prevail in this country, or the observances which in France are more immediately associated with *le jour de l'an*

Since our December notes were in type we have received from Messieurs Armand Colin & Cie. assurances that all the names of English teachers sent from this office have been duly paired with French teachers desirous of entering into correspondence, and that a considerable number of the latter still await the notification of names of English teachers wishing to correspond with them. We therefore venture again to commend this practical mode of improving their knowledge of the French language to our many readers who are in a position to profit by it; and appeal to them to send us their names so that the necessary arrangements may be made by our co-workers in France for bringing the would-be correspondents into communication with each other. For some time special difficulty was experienced in finding a sufficient number of Englishmen to match with the Frenchmen who sent in their adhesion to the scheme, and a like difficulty in finding a sufficient number of lady teachers in France to correspond with their professional sisters in England. Now we are desirous of receiving the names of English teachers of both sexes; and we trust we may soon have a long list to send to MM. Colin. Of the one we were able to send in December, their letter says, 'Cette liste est loin de nous suffire!'

The great increase in our circulation which has taken place during the last few months proves that we have now many more readers than we had when the scheme of International Correspondence for Teachers first found a place in our columns, now some twelvemonths since. And this suggests to us that, in appealing for fresh adhesions, it may be well for the sake of our new readers briefly to restate the nature of the scheme, which our friend M. Mieille has the honour of originating in this systematic form. Those teachers in England who have some knowledge of French and wish to improve it by correspondence are invited to send us their names and addresses, with indications as to age, sex, and position.

French teachers in like manner are invited to communicate with the editor of *Le Volume*, published by A. Colin & Co., Paris. In collaboration with the latter we then undertake as speedily as possible to arrange in suitable pairs the names received. No fees are charged, and our responsibility ends with the notification of the arrangements made. We hope, however, that we may from time to time be informed by our clients of the progress of the correspondence, and we shall be glad occasionally to print in these columns specimens of the letters which pass.

From a recent number of *Le Volume*, in which appears a list of correspondents above named, we transcribe in French the directions given to those concerned.

> 'Nous rappelons aux correspondants français que, sans autre formalité, ils doivent commencer à correspondre avec les Anglais dont les noms sont inscrits en face des leurs.
>
> '*Les Français doivent écrire les premiers.*
>
> 'Leur première lettre sera écrite en français, la seconde en anglais, et ainsi de suite. Les Anglais leur repondrant la première fois dans leur langue, la deuxième fois en français.
>
> 'Deux lettres par mois doivent suffire.
>
> '**Avis important.**—Nous recommandons instamment aux Français d'écrire très lisiblement, en tête de leurs lettres, leur nom, leur prenom, leur adresse.
>
> 'Nous leur conseillons de demander à leurs correspondants de leur retourner, corrigées, les lettres qu'ils écriront en anglais.'

Changing the names as may be necessary we wish to impress this advice on our own readers.

It must be understood that those for whom we undertake to cater in this matter are teachers and subscribers to our journal, and with adult teachers we are quite willing to include senior pupil teachers. We desire, however, to remind our readers of the similar work which is undertaken for schoolboys and girls through the medium of the *Review of Reviews*. The enterprising editor of that remarkable monthly has met with a large measure of success in the Scholars' branch of International Correspondence; and we are asked to make it known that he is at present prepared to take any number of names of *boys* and *young* pupil teachers for pairing in correspondence. We hope such of our readers as have classes for French in their schools will take note of this announcement and communicate with Mr. Stead at Mowbray House, Victoria Embankment.

TO SCHOLARSHIP CANDIDATES: A juxtalinear translation of 'UN PHILOSOPHIE SOUS LES TOITS' will be published from 'The Practical Teacher' Office early in February. See announcement in our advertisement pages at end of this Journal.

Our Monthly Retrospect

EDUCATION IN ENGLAND.

I.—N.U.T. NOTES, &c.

BY T. B. ELLERY, F.R.G.S.,

1895-6 *President of the National Union of Teachers, Chairman Benevolent Central Committee.*

Sir Richard Temple and Superannuation. Some teachers, like other people, have particularly short memories, but not one of the great army engaged in the nation's schools will willingly or readily forget the magnificent services rendered by Sir Richard Temple in the cause of Superannuation. In the House of Commons and elsewhere he has made the subject almost his own, working early and late with the knowledge, tact, and judgment which were characteristic of his Indian administration. As Chairman of the Union's Superannuation Committee I have had many opportunities of knowing what a deep interest he has always taken in the schools of the people, and in the teachers engaged therein. He helped us considerably in our crusade against the so-called 'Payment by Results,' and when he witnessed a reform in that direction, he turned his attention to Superannuation. All the teaching world knows what he has done in that particular field, his gallant and persistent fight to induce the Government to introduce the Bill, his admirable chairmanship of the Select Committee of the House of Commons appointed to consider the question, and his excellent speech in moving the resolution of Feb. 24th, 1893. But he has done more than this. In season and out of season he has given the benefit of his advice to the leaders of the Union, he has brought his great influence to bear upon the Government, never missing an opportunity, and in a hundred ways he has rendered invaluable service.

I well remember with what tact and skill he presided over the deliberations of the Select Committee of the House, with what care he examined the witnesses and brought out all the important facts necessary when the time came to draft his Report.

I was one of those who gave evidence, and I have a lively recollection of his 'examination in chief' and of the 'cross examination' at the hands of Mr. Acland, afterwards Vice-President of the Council, and others. It was, I know, a great disappointment to him that his labours were not crowned with complete success before he retired from parliamentary life. Still he has never lost hope; indeed, he has inspired hope in those who have been inclined at times to be despondent.

Sir Richard at Russell Square. On the 8th of January we had the pleasure of once more welcoming Sir Richard at Russell Square. He had left his home in Worcestershire and journeyed to town to confer with the Executive as to the policy to be pursued in the coming Session of Parliament. I need not say he was heartily cheered when he rose to speak. In these columns over and over again I have preached 'caution,' and I have tried to show the danger of a too aggressive policy. Sir Richard took exactly the same line on the occasion to which I am referring. He assured us, though we scarcely needed the assurance, that he was as deeply interested in the question as ever, that he had approached Mr. Balfour, and had taken certain other steps which, in his opinion, would help the cause. There was a suggestion in his speech that Superannuation might be mentioned in the Queen's Speech, but he very properly pointed out that even if there were no mention of the subject in that Speech, it was not to be taken as settled that nothing would be heard of it in the next session. Personally, he was almost certain that the Bill would be introduced and read a second time. After that he could not say what would happen. It might be that the Government would then let the matter rest for a time, but of course he had no means of knowing what would be done. I am bound to say that those of us who were present felt that this was an unsatisfactory statement. We shall not be satisfied if the Government take the Bill to the Committee stage and then drop it. I cannot believe Mr. Balfour means to do this. Everything is ripe for legislation; the time has arrived for the fulfilment of promises. It may be that Sir Richard was merely suggesting what might possibly happen. I hope that was all that was in his mind. In the few remarks I made as Chairman of the Committee, I tried to 'draw' Sir Richard on this point by expressing a hope that he was keeping nothing back from us. In his reply he assured me he had been quite frank and had kept nothing back. We must now see that our preparations are complete and that we are ready for any and every emergency. I am grateful to Sir Richard for his continued interest, and I am grateful to him, too, for the compliment he paid Mr. Yoxall and Mr. Gray. 'Everything,' said he, 'has been judiciously and wisely done,' and I agree with him. 'Our members' have done splendidly, though it is not well that all the steps they have taken should be made public.

Once more we shook hands with Sir Richard, and soon after the Superannuation champion was on his way home!

Readers! rest assured there is no cause for alarm. On the contrary, those of us who have charge of the question are as confident as ever.

The Conference of Science and Art Teachers. The Executive of the Union, anxious to draw all classes of teachers together within the fold, has from time to time organised conferences of 'special interests.' We had the Rural Teachers' gathering at Exeter Hall, the Voluntary School Teachers' Conference in Birmingham, and now we have just had a similar Conference of Science and Art Teachers, members of the Union. The meeting was held in the Society of Arts' Rooms, Adelphi, on Friday, January 7th. Mr. Addiscott, the President of the Union, gave us a very useful and thoughtful address; after which Mr. Bowden, Chairman of the Union's Technical Committee, introduced the question of the altered form of the Directory, which met with the unanimous approval of the Conference. On the question of the new system of payment a capital discussion took place. Mr. E. Gray, M.P., was convinced that the new mode of payment meant the destruction of the small classes. His attack on the Science and Art Department was keenly enjoyed. Personally, I am glad that the form of the resolution moved by Messrs. Bowden and Anderson was amended. It is surely too late in the day to ask for a return to the old system of examination and payments. The resolution, as amended, will commend itself to everyone:—'That this Conference, whilst expressing its satisfaction with the change, whereby progress is made towards the substitution of inspection for examination, is convinced that the new mode of assessing the grant will result in financial loss to most Science and Art classes, and in the absolute extinction of many of the smaller classes. This Conference is further of opinion that the rates of payment should be materially increased.'

Suggested Reforms. Among the reforms suggested were the following:—That the regulations for the teaching of Science and Art should be laid upon the table of Parliament for a period of one month, as in the case

of the Education Department's Codes, that instructions to inspectors, similar to those issued by the Education Department, should be issued by the Science and Art Department: That no person should be permitted to award grants upon the inspection of classes unless such person be qualified in the subject inspected and have had experience in the conducting and teaching of such classes: That the different art subjects should be regarded as separate subjects for purposes of registration: That science students, like art students, should be permitted to join the class up to the 1st of February: That the unnecessary and harmful restriction upon the teaching of science caused by the new regulations, whereby no student may be registered for a day attendance under the Department of Science and Art whose name is on the register for a day attendance under the English Education Department, should be removed: That the fixed grant in schools of science should be at the rate of not less than £5 per head, provided that rooms are suitable, equipment satisfactory, and staff adequate, such grant not to be reduced or withdrawn altogether except after warning in cases of real inefficiency or neglect: That the Circular of 1st December 1897, in which instructions are

MR. C. SCOTSON.

given to inspectors to report any case where 25 per cent. of the first-year students leave the schools at the end of the year, or more than that percentage of the second year leave at the end of the second year, in order that the Department may consider whether such schools should continue to be recognised as Schools of Science, should be withdrawn: That there should be a uniform standard of examination and inspection in each district, and from year to year: That there should be improvement in many of the regulations now in force with respect to the examination of the art papers: That no class established especially for the instruction of teachers or pupil teachers should be considered unnecessary, and that Town Councils and School Boards should not be debarred from establishing in their district schools where necessary.

The Speeches. I have endeavoured to give as briefly as possible the effect of the resolutions adopted by the Conference. No one could follow the debates without feeling that the men who spoke were qualified by their attainments and experience to offer suggestions for reform. It will be the duty of the Union to see that representations are made in the proper quarters, and, if necessary, the attention of Parliament drawn to what are admittedly grave evils. Some excellent speeches were delivered in the course of the day. My old friend, Mr. Scotson, of the Central School, Manchester, made his points with all his old and well-known vigour. It is always a pleasure to listen to him, for everyone knows that he is speaking that which is in his mind, and that he hits straight from the shoulder. He was heartily cheered, as he deserved to be. Another excellent speech was that delivered by Mr. Sharp, of Hull, who gave his own experiences in a physical laboratory. Other representatives also spoke extremely well, but it is impossible, in the space allotted to these notes, to mention all the names that occur to me. Generally, I should say a good day's work was done; there was no waste of time; the resolutions were wise and practical, and I trust that many reforms will be the outcome of the Conference. The Union is to be congratulated upon having achieved another important success. All classes of teachers will feel that our organisation is powerful enough and broad enough to include every branch of work connected with the schools of the country, and that being so the Union must continue to prosper.

Retirement of the Rev. T. W. Sharpe, C.B. Very general regret has been expressed at the retirement of the Rev. T. W. Sharpe, C.B., from the post of Her Majesty's Senior Chief Inspector of Schools. For many years past he has aimed at the improvement of our system of education in the primary schools, and of the conditions under which teachers and children work. Many reforms are the result of his unremitting attention to the duties of his office. He is an educationist of the first rank, and has done his work in such a way as to win for himself the esteem and affection of all who have been brought into contact with him. It is generally understood he is primarily responsible for the introduction of 'Scheme B Arithmetic' into the Code. It is not a perfect scheme, but he can fairly claim that at least it is based upon right principles. His happy manner, his cheerful face, and his words of encouragement, will long be remembered by the many who have been privileged to meet him. As his work will be more fully dealt with in an early number of the PRACTICAL TEACHER, I must not say more, but I feel I may express the hope that he may have many years of happiness before him; health and strength, and all other blessings.

The Coming N.U.T. Elections. We shall soon be busily engaged in the elections. For the Vice-Presidency we have four candidates in the field—Mr. T. Clancy (Portsmouth), Mr. J. C. Horobin (Cambridge), Mr. M. Jackman (London), and Mr. F. Peaker (Leeds). Nominations may not settle the question of course, but coming, as they do, from the Associations in meeting assembled, they ought to be a fair indication of popular feeling. If 'nominations' are really to be relied upon, Mr. Clancy's return should be absolutely certain, for he has been adopted by 239 Associations—another Union 'record,' I believe!

*** A SPECIAL PAGE FOR LONDON SCHOOL BOARD NOTES.

THE doings of the London School Board necessarily loom largely in the record of education in England. When it is remembered that the Board has the care of the education in a district with as great a population as that of Scotland or Ireland, that it has in its own schools upwards of half a million children, and that its receipts and expenditure are each nearly three million pounds a year, it necessarily follows that its proceedings are of exceptional interest, especially as the example of the London School Board is largely followed in the provinces.

To the practical teacher, with little time to follow long debates, we hope to give the essence of its doings in the columns of this Journal, and especially to chronicle the doings of those who are greatly interested in the development of our primary system into a really national system of education. The next legislation will bear upon those points where primary and secondary education meet, and the future welfare of the practical teacher in both kinds of schools will greatly depend upon the outcome and the character of such legislation.

☞ **Notes on the Coming INFANT SCHOOL TEACHERS' CONFERENCE will appear in these columns.**

II.—TEACHERS' WINTER MEETINGS IN LONDON.

BY CATHERINE I. DODD, L.L.A.
Mistress of Method, Owen's Day Training College, Manchester.

During the last decade we have become very familiar with Holiday Courses and Summer Meetings for teachers. The Americans gave us the idea in the first instance, and Mr. Sadler and others interested in University Extension work created the first Oxford Summer Meeting some twelve years ago, which has been the forerunner of so many similar gatherings since.

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The Summer Meeting quickly became popular. Few of us have been able to resist a Sloyd course in Sweden, a Modern Language course at Caen, a Pedagogical course at Jena, a Manual Training course at Leipsic, or a Literature course at Paris, and within our own island are to be found Brush-Drawing, Metal Work, Dairy Work, Wood Carving, and Kindergarten courses, offering teachers their many attractions during the summer months. These courses are often a valuable help to teachers, they stimulate enthusiasm and give opportunities for the exchange of ideas on educational subjects.

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Now the Winter Course has made its appearance, and during the month of January the Herbartians have been flocking to the College of Preceptors to hear discussions on educational problems. Many teachers are in London during the Christmas vacation, and Dr. Findlay was right in his conjecture that they would be glad of an opportunity of widening their knowledge of Herbartian methods.

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'What are Herbartian Methods?' is a question one frequently hears from teachers, and the answers to this question are as various as the definitions of the meaning of Kindergarten. 'Herbartianism is Kindergarten for older children.' 'It is a new method of teaching History.' 'It means teaching fairy tales and Robinson Crusoe instead of History.' 'It means teaching according to the five formal steps.' These are some of the definitions which I have come upon. All of which are as true as the statement that 'Kindergarten means plaiting pink and blue papers into little mats.'

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Herbart was a distinguished German philosopher. He endeavoured to make teaching practice agree with the mental process by which children take in ideas. He wrote books, and his theories have been interpreted and put into practice by many disciples and followers in Germany and in America. Those who want to know what Herbart thought and taught must study him patiently, and not expect to have a ready-made definition which will teach them his *method* as easily as we can get a recipe for making raspberry jam.

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We English teachers love the word 'method.' We cannot get rid of it. It certainly sounds imposing and impressive to the ignorant. We teach on the 'scientific' method, the 'Gouin' method, the 'brush-drawing' method, the 'inductive' method, or the 'rationalistic' method, just as though there were a dozen ways in which a child may take in ideas, and the teacher had the privilege of prescribing the particular way for his pupils. There is only one way in which children can learn, and to find this way we must look for the universal laws which govern the mind. Herbart did this, and his followers endeavour to make their teaching correspond with these laws.

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Dr. Findlay's Winter Meeting began on January 4th, and lasted for a fortnight.

The following are some items from the interesting and varied programme :—

'The Principles of Class Teaching.' Ten lectures on the Curriculum of the Secondary School, and the preparation of lessons.

In these lectures Dr. Findlay discussed the aim of teaching, the principles which underlie the selection of subject-matter, and the construction of a time-table, and the teacher's preparation of lessons.

Lectures on :—

'Modelling as a means of Education throughout the School.'

'The Application of Art Work to the Teaching of other subjects.'

'Brush-work and its connection with Elementary Science Teaching.' By Mr. E. Cooke.

'The National Gallery and its Educational Uses.' By Sir Joshua Fitch.

'The Language of Line.' By Mr. Walter Crane.

'The Teaching of Science.' By Dr. Kimmins.

'Milton's "Minor Poems."' By Mr. Arthur Sidgwick.

'The Educational Aspect of the History of London.' By Sir Walter Besant.

'The Voice and its Training.' By Mr. McDonald.

'Eyesight in relation to School Life.' By Dr. Colman.

In connection with the Art and Brush-work lectures, there were exhibits of children's work, from the crudest attempts of children of five to illustrate the story of 'Jack and the Beanstalk' and the 'Dragon's Teeth,' to the beautiful brush-work of pupils of fourteen to sixteen in illustrating the story of 'Persephone' and portions of Spenser's 'Faerie Queen.'

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These sketches were a sufficient proof that in early childhood there is a strong instinctive love of producing figures, architecture, and animals, which it is well to encourage.

The discussions which took place before Dr. Findlay's lectures were sometimes spirited, and always helpful.

It was interesting to watch the enthusiastic young teacher, who had just become alive to the importance of the concentration of studies, rise and demand half-indignantly how the demands of examinations are to be satisfied if one only considers the child's mental development? These are old questions to Herbartians, and the only reply is that the examinations must be made to give way to the child.

It was pleasant to meet old acquaintances, with whom one had studied in Jena, among the audience, and to discuss over again one's educational faiths.

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Dr. Kimmins was very inspiring on Elementary Science teaching. He insists with Pestalozzi that the child is to have 'the sacred right of discovery,' hence he would require children to measure lines, triangles, curved lines, and the distance round cylindrical surfaces. He would have him measure areas of squares and oblongs, and find areas of triangles and parallelograms, and circles, and the surface areas of solids, after which measurements of volume, mass, and density should be made.

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These practical suggestions recalled to my mind the boys of a German school intent upon taking the measurements of a bridge and working out problems relating to the construction of the bridge afterwards. Visits to schools and laboratories were arranged so that teachers might see the children at work and examine the apparatus used. There were also visits to the National Gallery after Sir Joshua Fitch had laid down its educational uses. There were exhibits of geographical slides, of circulating school museums, and of the apparatus used in modelling.

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An interesting visit was paid to the Educational library in Parliament Street, which is being formed under the direction of Mr. Sadler. This library belongs to the Education Department, and is for the use of teachers. In glancing along the shelves the teacher's eye lights upon many volumes which he longs to possess, and he promises himself at some future time a week in London to read in the Educational library.

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Many teachers gained new inspirations from the Winter Meeting, and it is hoped that it may be repeated again next year, so that they may come in even larger numbers to learn some of the things which the Herbartians have to teach.

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Among the other holiday courses in London during January may be mentioned: The Froebel Society's Winter Course; the Course of the Royal Drawing Society; a Course on Greek Coins and the Greek Theatre in connexion with the Classical Archæology Society.

Notes on 'EDUCATION,' 'CHILD STUDY,' &c., by Miss Dodd, will appear month by month.

EDUCATION IN SCOTLAND.

I.—E.I.S. NOTES, &c.

BY JAS. PATERSON,

Vice-President of the Educational Institute of Scotland.

The Congress. The twenty-fourth annual Congress of the Educational Institute of Scotland was held at Stirling on the 4th and 5th January. Alike as regards the intellectual and the social functions, it was a great success, and reflected much credit upon the various committees of the local branch intrusted with the arrangements. A full report will be found in another column.

S.A.T.A. The Federation Council of the Scottish Assistant Teachers' Association met at Stirling during Congress week under the presidency of Mr. H. McCallum, M.A., Glasgow. The Secretary gave in his report on the remit from the September meeting regarding scheme of salaries. It was agreed to draw up a scheme arranged according to the size of towns. The questions of an organising secretary and of an assistants' magazine were sent down to the various branches. Mr. C. McDonald submitted his report on his visit to Bradford as delegate, and remarked on the splendid *esprit de corps* that their English brethren exhibited. An invitation to Holland had been received, but the Council regretted their inability to accept it. The question of representation on the Executive of the Institute was discussed. In view of Lord Balfour of Burleigh's reply to the cases of dismissal of assistants, it was resolved to urge upon class teachers the desirableness of identifying themselves with the E.I.S. as well as the S.A.T.A.

History in Schools. The able address of Professor Lodge, of Glasgow, at the Stirling Congress, on the teaching of history in schools ought to do much to counteract the unfortunate but unmistakable tendency of the present Code to discourage the teaching of history. As the learned professor remarked, however, the ideal book which should treat of British history as a whole, and bring Scottish and English history into new relations with each other has still to be written. Will not Professor Lodge himself undertake the task? No one better qualified could be found.

Science in Schools. The School Board of Glasgow have received a communication from the Education Department, requesting that they should carry on the teaching of science and art subjects in their elementary and secondary schools as formerly, as the Department is reconsidering the whole matter with the view of deciding whether it may yet give financial assistance to School Boards carrying on science and art classes in their respective schools.

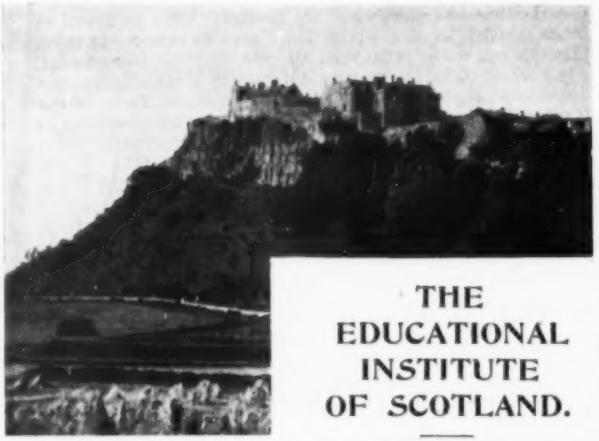
Leaving Certificate, 1898. Circulars bearing upon the 1898 Leaving Certificate Examinations have been issued by Sir Henry Craik. They contain none but minor changes. Candidates for a Lower Grade Certificate in Mathematics will be at liberty to take the arithmetic paper of either the Higher or Lower Grade, and when higher arithmetic is taken special mention will be made on the certificate. My Lords express the hope that pupils will not be sent in for the examinationun less there is a reasonable probability of their being able to obtain the certificate for which they are presented Their Lordships also condemn the practice of sending in candidates at the age of eleven or twelve years, and trust that in future candidatesbelow thirteen years of age will not, unless under special circumstances, be sent in for the examination.

Dismissal Cases. The deliverance of Lord Balfour of Burleigh on the Institute's list of dismissal cases presented to him is, to say the least, disappointing. That it might have been more sympathetic is the opinion of many, and not of teachers only, for the leading daily paper in the West of Scotland writes as follows :—'It is to be hoped the Department does not mean to convey the impression that it ignores that weakness in the School Board system which scarcely needs statistics to prove its existence. Lord Balfour ought to be well aware that the enlargement of the School Board area is a subject which the very existence of the agitation among the teachers should commend to the very careful consideration of the Department. It is to the interest of education that the time and energies of the teachers should be saved as far as possible for their proper work, and we cannot but think that this end would be at least approached if the Department, while resenting dictation, were to show in greater measure a disposition to give due weight to the representations of the teachers by evincing its responsiveness to such questions as that which we have suggested. It would have done no harm to express in a duly guarded manner the views of the Department itself on the whole question ; and a little sympathy would not have been amiss, even if it had gone no further than a declaration of the Department's desire to further every reform of the educational system which promised to improve the efficiency of the teacher and raise his status in the community to a level with the importance of the function which he fulfils.'

The late Rev. Dr. McLaren, ex-President E.I.S. In the lamented death of the Rev. John McLaren, D.D., of the united parishes of Larbert and Dunipace, the Church of Scotland has lost one of its ablest and most accomplished ministers, and Scotch education and Scotch teachers one of their warmest friends. Born in Edinburgh seventy-four years ago, Dr. McLaren was educated at the Royal High School, and took an excellent position in all his classes. He left as dux of the school, carrying with him two gold medals and all the first prizes for which it was open to him to compete. A career of exceptional distinction followed at the University, from which, at the early age of nineteen, he was appointed Classical Master in George Watson's Hospital. Somewhat later he was offered, but, having resolved to enter the ministry of the Church of Scotland, declined, a professorship in India. In 1847 he was appointed to the charge where he had ever since remained, celebrating his jubilee during the past year. Next to his ministerial duties, which he discharged with the greatest faithfulness and success, the great work of his life was educational, and in recognition of it he was unanimously elected a Fellow, and afterwards the President, of the Educational Institute of Scotland. The degree of D.D. was conferred upon him by Edinburgh University in 1887. Dr. McLaren was held in the highest esteem by all classes, and by none more than by the members of the teaching profession throughout Scotland.

Honour to Mr. Innes, Fordyce. The St. Tarquin's Lodge of Oddfellows, Fordyce, lately gave an 'At Home' in the Public Hall, at which a presentation was made to Mr. Innes, Schoolmaster, Fordyce. The Chairman, Hon. Bro. Rev. Dr. Grant, said they were met chiefly for the purpose of making a presentation to Mr. Innes in appreciation of the valuable services he had rendered to the Lodge. He was sure he spoke the mind of all present when he expressed his deep regret that Mr. Innes was about to leave Fordyce. Both he and Mrs. Innes were held in high esteem by the community at large, and carried with them to their new home the best wishes of all present for their happiness and welfare. Bro. Mc Hardy, in making the presentation, spoke in similar terms, and Mr. Innes suitably thanked his fellow-members for their gift and recognition of any service he had been able to render them.

Glasgow Branch S.A.T.A. A general meeting of the Glasgow branch of the S.A.T.A. was held recently. Mr. Thomas Inglis, M.A., F.E.I.S., the President, occupied the chair, and there was a large attendance. The meeting unanimously agreed that a memorial should be sent to the Glasgow School Board stating that there is a general and urgent demand for great improvement in the salaries and position of assistant teachers. The memorial directs attention to the great difficulty experienced in obtaining suitable male candidates for the teaching profession, mainly owing to the want of prospect of rising to the higher positions and the insufficiency of the salaries. Special consideration is asked for the following points as being of the utmost importance :—(*a*) That increases of salary be granted annually ; (*b*) that promotion be determined solely by length of service, practical ability, and scholarship ; and (*c*) that all vacancies be intimated to the staffs of the various schools. The meeting afterwards unanimously adopted the following resolution :—'That this Association, convinced of the evils of over-examination, strongly deprecates the institution by School Boards of examinations in Religious Knowledge, History, etc., and, where such are already in operation, respectfully urges their discontinuance.'



STIRLING CASTLE.
(From the South-west.)

THE EDUCATIONAL INSTITUTE OF SCOTLAND.

II.—CONGRESS AT STIRLING.

FROM the richness of its historical associations, from the brilliance of its educational record, and from its unique position between the Lowlands and the Highlands of Scotland, probably no place more suitable could have been selected for the twenty-fourth Annual Congress of the Educational Institute of Scotland than Stirling. On the last occasion that the Institute held its 'movable' meeting at Stirling, the President was the late Rev. Dr. McLaren, of Larbert, whose death Dr. Campbell so feelingly announced to the Congress on the morning of its second day, and whose loss is such a severe one to Scottish education. Had space permitted we should have liked to give some extracts, educational and historical, from the admirable official guide of the Institute—an exquisite souvenir of the meeting—gifted by the enterprising firm of Messrs. Nelson, and written by the emeritus-rector of the Stirling High School, Mr. A. F. Hutchison, M.A.

Tuesday, 4th January.

Soon after 11, Dr. Campbell, the President, ascends the platform, accompanied by the local magnates of the royal and historic burgh, by the senior Vice-Presidents, by the officials and the other dignitaries of the Institute. The Institute is welcomed to Stirling on behalf of the Corporation by its civic head, Provost Forrest, by the School Board through the Rev. D. D. Ormond, its Chairman, and by Councillor Jas. Thompson for the Educational Trust,—the patrons of the Congress.

The kindness of the reception acknowledged, Dr. Campbell proceeds to deliver his introductory address. He is the happy possessor of a fine presence and a resonant voice, which is heard distinctly in all parts of the crowded hall. He reviews the

Last Twenty-five Years of our Educational History.

Pauperism and crime have during that period been reduced in great measure. In this triumph, he thinks, education and school can claim some share. To have kept back the stigma of pauperism, to have maintained Scotsmen and Scotswomen in honest independence, is something for this quarter of a century to boast about. From beginning to end the governing principle in Scottish education has been and must continue to be the old motto, 'Salus populi, suprema lex.' On this platform the Institute has stood from the beginning, on this platform they stand to-day, to this test they wish to submit all their proposals. If it is proved that they are seeking what is contrary to the public interest, their own principles bid them stop, but if persistent argument shows that what they seek is for the general good, then the adoption of their principles must come sooner or later. The public have spent a great amount of money on education, and yet they have not got from it what they expected, and for all this their educational system and not their teachers must to some extent be held responsible. What then are their weaknesses? The great weakness in Scottish education is that they have too many masters. Let them have the Department over all, and a suitable local governing body in each district, and they shall have made one great step in advance. If there is any weakness in the teaching staff, if Scotland wants the best men available to train the rising generation—and he thinks it does—then the teachers' position must be made an object of ambition, one which the best men will feel proud and satisfied to occupy, and find sufficiently rewarded with present respect and emoluments, and security against future mischance. Another weakness is that one-eighth of the school places are empty, and that every year a large number of children are allowed to leave school while yet mere children. There are few more important questions before them, he says, than how this leakage and intellectual waste are to be stopped. He winds up his eloquent, able, and convincing paper by saying that what we need at the present moment is a statesman who will weld into one efficient whole all the elements of our modern educational system. Every teacher of whatever grade or standing must strive to find a place amongst those who seek the common good—'Non sibi, sed patriae, profuturi'—the servants not of themselves, but of their native land.

On the motion of the Rev. D. D. Ormond we accord a hearty vote of thanks to Dr. Campbell for his paper. Professor Wallace, Edinburgh University, next addressed the Congress on the question of

'Agriculture as an Educational Subject.'

In the course of his paper he points out that provision in three distinct stages—introductory, intermediate, and higher—is necessary. That the lower stage can be satisfactorily undertaken by the country schoolmaster who has undergone a course of training for the purpose, has recently been fully demonstrated in Scotland in connection with the summer courses of the Edinburgh University. The main difficulty is the intermediate stage—the bridging of the gulf between the work of the parish school and that of the university, a difficulty which he thinks can be surmounted. The next important step is the establishment of a district authority to which various grants for technical and secondary education can be entrusted. We agree with one dissentient to the motion:—'That increased encouragement should be given to teaching of the principles of agriculture as a class or specific subject in our schools.'

Mr. H. McCallum, M.A., Pupil Teachers' Institute, Glasgow, who represents the class teachers, discusses the question of

'Large Schools and Assistants.'

After arraying quite a host of figures with regard to the sizes of schools, which he divides into two classes—'large,' those with an accommodation exceeding 1,000, and 'monstrously large,' those over 1,500—he deals with the subject of promotion. From statistics he shows that the last appointed second master will, if alive, become a head-master in Aberdeen in 36 years, in Dundee in 35 years, in Edinburgh in 22½ years, in Glasgow in 26 years, and in Leith in 50. He then refers to the great increase of lady teachers, who are storming the profession with a rush, and to the decrease of male teachers, and is of opinion that the latter deplorable fact is attributable to this cause, viz., that teaching has ceased to attract lads of promise and ability. In concluding, he desires to see the Departmental System given a trial in the large schools, and thinks that increase of salary will not fully meet the demands of the class teachers, but that they also desire increased responsibility, and consequently status. Around the motion on this paper arises the most animated discussion, ending in the assistants accepting as a compromise the following resolution:—'That this Congress is of opinion that the policy of many School Boards in building excessively large schools is unsatisfactory, and not in the interests of the pupils.' This disposed of, we adjourn for half an hour.

On resuming, the Congress presents the diploma of Honorary Fellow to Sir Henry Campbell-Bannerman 'for his signal services in the cause of education, and for his enlightened advocacy in Parliament of every measure tending to the advancement of education.' Dr. Mackay, Treasurer of the Institute, points out that not more than three such degrees are ever conferred in one year. This year the other recipients are

Mr. C. Stuart Parker, Ex-M.P., and Mr. Ross, Dunfermline. Dr. Campbell, on behalf of the Institute, hands over the diploma, remarking that we know no politics, and that Sir. Henry is receiving the honour for his services to education Sir Henry replies in an interesting speech, in which he seeks to give some sound advice to the educators of the country. His subject is

'Education not Instruction.'

Let the teachers give their pupils as much information as they can on all the facts of history, the phenomena of nature, and the beauties of literature, but even then their work is only half done. It is the teacher's function to train their minds, to bring forth the qualities, mental and moral, which they possess, to inspire them with high ideals. He then refers to the fact that we as an empire are losing trade here, abandoning markets there, and that other countries are stepping in where we had complete control of the market. All this, he says, is attributable to our tendency to think we know better than those who are to consume the articles we provide—our tendency to force our own ideas upon the misguided foreigner.

The next paper is on

'The Examination System,'

and is read by the Rev. J. Aitchison, Chairman, Falkish School Board. He devotes the greater portion of his paper to pointing out the objectionable features of the system of examinations. On the motion of Mr. Lowson, who almost entirely disagrees with the whole paper, we thank the reader. Mr. J. G. Thomson, Paisley, one of the Presidents-Nominate of the Institute, in a clear, deliberate speech, proposes a very exhaustive motion dealing with the question of examinations. Dr. Mackay, in a short speech—a welcome relief at this stage of the proceedings—moves :—'That it is urgently necessary that the present diversity of educational authorities should be brought to an end by the establishment in every district of one body.' We are then ready to receive the

Deputations from the Sister Associations.

Mr. C. J. Addiscott, well-known to readers of the PRACTICAL TEACHER, represents the N.U.T. The reception accorded to him is most hearty, the audience rising to their feet. He expresses the pleasure he has received from the Congress, lets us know what is being done in England, and asks us to assist them, especially in the matter of superannuation. Mr. J. Hazlett, Dublin, represents the I.N.T.O., and to him also is accorded a warm welcome. He reciprocates the kindly feeling, touches on a few of the questions peculiar to Irish teachers, and acknowledges the valuable hints he has received from Congress papers.

It is now rapidly nearing five o'clock—the Congress has sat almost continuously from eleven. A sigh of relief is audible when the President announces adjournment to next morning at eleven.

Wednesday, 5th January.

Punctually the Congress resumes its second day's work. Dr. Ross, E. C. Training College, Glasgow, reads a paper on

'The Supply of Trained Teachers.'

He adduces statistics to show that the number of male teachers has increased by less than one-third per cent. per annum since 1885, while certificated women teachers have increased by nearly 80 per cent. In 1879 four-fifths of the female teachers were trained, now fully one-third are untrained. He shows the difficulty School Boards are experiencing in obtaining teachers for the outlying districts even when £50 a year and a free house are offered. To sum up, he says, the untrained teacher is gradually taking the place of the trained one, and the female teacher the place of the male one. The causes of the latter are the scarcity of male candidates, and the growing discontent of male teachers at the slowness of promotion. We give Dr. Ross thanks for his valuable paper on the motion of Mr. Blackstock, another of the Presidents-Nominate.

'Child Study'

forms the subject of the next paper, which is read by Mr. Jas. Todd, Stirling. He is of opinion that increasing attention should be given to this subject, and in an elaborate and thoroughly valuable paper he speaks of the advantage of teachers understanding the laws of the growth of the mind. Miss Clapperton, Secretary, Child Study Association, Edinburgh, refers to the work done in Scotland and England in this subject, while Dr. Gunn, Edinburgh, in a very clear and forcible manner, points out the advantage of the child study *attitude of mind*, emphasises Mr. Todd's points, and reminds the audience of the position into which a child, who goes to school for the first time, is suddenly thrown—from being *questioner* to the new state of being *questioned*.

On the resumption after luncheon, Professor Lodge, Glasgow, in a very able, practical, and suggestive paper on

'The Place of History in a School Curriculum,'

advocates its retention at least. In a town reminiscent of history making, it is not difficult to arouse the patriotic sentiment. Owing to the new grouping of class subjects, history is rapidly being eliminated from our schools ; this elimination is, he says, a matter of public importance. He succeeds in arousing the sympathy of the meeting—a sympathy which Mr. Beattie, Oban High School, gives voice to when he says that if the teachers of Scotland were polled, a very small minority would be found to favour the abolition of history from our schools.

Mr. Lowson, Stirling, next addresses us on the

'Place of Mathematics in Schools.'

In a very masterly paper—bristling with well-reasoned points and aphoristic sentences—he points to the great disciplinary power of mathematical studies. He suggests certain limitations which are desirable for the teaching of this subject in elementary schools. These limitations do not appeal to a great number present, as is evidenced by the reception given to Mr. Stevenson's remarks in proposing a vote of thanks to the reader.

Without a dissentient voice we agree with the Secretary's resolution with regard to security of tenure, and to Mr. Blackstock's on superannuation.

Dr. Munro's paper is, in his absence, read by Mr. Marshall.

'Health Conditions in School Life'

is the subject—and a valuable contribution to the day's proceedings it is. In it he urges a closer co-operation between the sanitary and educational authorities.

With the usual votes of thanks the Congress of 1898 finishes, so far at least as the heavy work is concerned.

The social functions were a conspicuous success, as they deserved to be. Among the members of the local Association, who worked so hard to make the Congress pass off well, may be mentioned Dr. Campbell, Mr. Lowson, Mr. Wilson, Secretary, on whose shoulders, no doubt, the largest share of the burden fell, Mr. Philip, and the conveners of the various Committees. The warmth of the reception accorded to strangers was in marked contrast to the disagreeable, foggy weather that prevailed during the greater part of the two days. If a word of adverse criticism may be allowed, objection may be taken to the number of the papers, and to the excessive length to which some of them ran, and as a result to the lack of discussion on many of the more important points referred to in the papers. Nevertheless it was the unanimous opinion of those present that the Congress of 1898 would materially contribute to the moulding of public opinion on matters of educational and professional importance.

A Third contribution in connection with our series of RECREATIVE TRAVEL PAPERS BY PRACTICAL TEACHERS, entitled 'A VISIT TO FLORENCE' fully illustrated, will appear in our next number.

EDUCATION ABROAD.

BY E. E. FOURNIER D'ALBE, B.SC., A.R.C.S.

THE practical execution of the new Prussian law for the regulation of teachers' salaries is meeting with some difficulties owing to the large amount of preliminary work to be gone through by the local authorities. This has to be finished before the amount of State aid can be determined. In view, however, of the delay in the rural communes, the Government has decided to begin the payment of the minimum age increase pending the decision as to its proper amount.

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STUDENTS of chemistry and physics at Heidelberg University are now compelled to insure themselves against accidents through an insurance company at Stuttgart. The amount insured in case of a permanent disablement is £100 per annum for life, and a corresponding amount for partial disablement. The premium is 3s. per term, payable in advance. Students who are only present at the performance of chemical and physical experiments pay 1d. per term. The regulation is a very good one, and should be largely imitated. Perhaps the premium, moderate as it is, might be still further reduced, so as to make it merely nominal.

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RUSSIA is making strong efforts to make itself independent of foreign technical experts. A committee, appointed by the Imperial Technical Society of St. Petersburg, has investigated the question, and has prevailed upon the Minister of Public Instruction to found at once two new technical schools. A scheme for technical instruction has been worked out, dividing the course into two parts, a one-year preparatory course in mechanics, mathematics, physics, and chemistry, and a two or three years' special course. A higher course for technical professorships is to follow.

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THE *Deutsche Blätter* contains an interesting article by J. Tews on the teaching of foreign languages in European schools. It spreads considerable light upon the status of the various languages as regards literary, scientific, and commercial importance. In Germany itself French stands first, then comes English, and locally Russian. In France, German is more largely taught than English to the male youth, but English is preferred as an accomplishment for ladies. In England, French has a better position than German, but the difference is not very great. In the United States, German is far ahead of French in the public schools, but the reverse is the case in the private schools. In Italy, Spain, and Portugal, French is much cultivated, and English and German are equally in the background. In Greece and Turkey nothing but French is taught. Sweden, Norway, and Denmark show a corresponding preference for German. In Holland, strange to say, French is given a decided preference over German, and German over English. In Belgium, German is extensively taught in the French-speaking districts. The Flemish districts learn French and English by preference. In Switzerland, German and French are taught everywhere, but English is preferred to German in the Italian cantons.

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THE condition of languages in Austria-Hungary is of special interest just now. The medium of instruction in Austria is German in 59 per cent. of the higher schools, Bohemian in 22 per cent., Polish in 10 per cent. It is Italian in 7 of these schools, Ruthenian in 2, Serbo-Croat in 4. French is taught in the German schools, and German in the other schools. English is nowhere. As regards Hungary, which has 151 Gymnasia and 33 *Realschulen*, the Magyar language is the medium of instruction in 165 of these. The chief foreign language taught is German, to which French is added in the *Realschulen*.

THE editor of the *Journal des Instituteurs* is taking a general vote of the French teachers on the question of long vacations *v.* abridged classes. This question has been opened by recent ministerial circulars proposing that the long vacation be extended to a maximum of eight weeks in all cases when the teachers have added to their duties by undertaking evening continuation classes. This sounds very just and generous, but it has been pointed out on the other hand that it would involve a disorganisation of the school staff, since not all the teachers could share the privilege alike. Shortened hours of the regular school are proposed as an alternative.

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BOKHARA has been since A.D. 1,000 a centre of Mahomedan learning. It is said to contain at the present time 103 colleges or lecture rooms, and to be frequented by about 10,000 students. The 'professors' number close upon 1,000, and the course of instruction lasts three to five years. There are three faculties—Theology and Law, Philology and History, and Philosophy, including mathematics, logic, metaphysics, and natural science. The classes begin daily at sunrise, and end about 3 p.m. On Thursdays and Fridays no instruction is given. The city also contains several hundred primary schools of the usual Mahomedan type. The teaching deals largely with the holy books, which are learnt by heart. The Government does nothing towards education, the teachers being supported by fees and gifts of produce. The fee ranges from 1 to 3 tillas (13 to 38 shillings) per pupil per annum. The teaching lasts from sunrise till sunset. Many of the schools have been endowed by private munificence, and the teachers are a highly-respected class. There are also girls' schools, in which reading, writing, and the works of Hafiz and other Persian poets are attended to. Religious instruction is confined to the most necessary passages of the Koran. The Russians will not have much left to teach these people.

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THE University of Sydney has an annual income of £31,494, of which £11,400 represent the Government grant, £8,171 University fees, £11,758 private foundations and bequests, and £165 miscellaneous items. There are four faculties—Arts, Law, Medicine, and Science—and in addition there are departments of mining and metallurgy, and of engineering. During 1896 the University staff included fourteen professors and thirty lecturers and demonstrators. The graduates rank equally with those of British Universities. Since the foundation of the University in 1850, 1,353 degrees have been conferred, of which 118 were obtained by women. University extension lectures are given in New South Wales and Queensland.

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THE *Unterrichts Blätter* contains a report by Professor Stelz on the school garden of Bockenheim. The chief distinction of this garden is that the plants are not grouped systematically, but by their habitat in ponds, moors, woods, and rocky lands. This is all on a small scale, of course, but is found quite practicable. The establishment of the garden cost £150, and the maintenance charge amounts to £10 per annum. The connection of botany with open nature is thus more closely brought home to the pupils. In the summer the whole of the lessons are often given in a large summer-house in the school garden.

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A VIGOROUS campaign against alcoholism has been begun in France through the medium of the higher schools. Courses of instruction are given in the physiological and pathological effects of fermented and distilled liquors. Among other subjects dealt with are the alleged beneficial effect of absinthe upon the digestive process, the influence of drunkenness upon mental sanity, strength of will, and moral character, and the connection between drunkenness, accidents, and suicides. In the girls' schools, additional instruction is given in the hygiene of drink, and of water intended for domestic uses. And all this is done in a country which has some reputation for sobriety.

SOME curious revelations concerning prehistoric writing and arithmetic are published by M. Piette in a recent number of *L'Anthropologie*. They are the results of the Frenchman's favourite pursuit of *spéléologie*, or the exploration of caves. M. Piette dug in the floor of a cavern near Mas d'Azil, in the Département of Ariège, in southern France. The second layer yielded a number of pebbles painted with iron oxide in various ways. The pebbles consist of quartz and slate, and are evidently taken from a river bed. They are sometimes coloured entirely, but most of them are painted with simple signs on one or both sides. Some of the pebbles have four to eight stripes, but never more than eight. These stripes M. Piette takes to signify numbers. Some round or oval patches he supposes to represent higher numbers, such as 10, or 9, if the people only possessed 8 simple figures. Besides these number-stones, there are others bearing images of crosses, serpents, trees, and reeds. But the most interesting objects are signs which closely resemble letters. In most cases they stand by themselves on the stones. Some stones have two or more letters together, giving the exact impression of an inscription. A curious result obtained is that of the twenty-three Phœnician letters thirteen are found on these stones. It does not follow, of course, that there is any connection between them historically, but the probability is suggested that the Phœnician letters were originally written on pebbles, as the shape of letters is more or less determined by the materials at hand, just as Ogham inscriptions were evidently first cut with a knife on wood. The discoveries form an interesting chapter on Prehistoric Education and the Literature of the Cave Dwellers.

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ITALY enjoys compulsory education since 1877. But the law has been a dead letter to a truly alarming extent. In the period from 1867 to 1895 the percentage of illiterate recruits has descended from 64 to 38; but even the latter figure is far and away beyond that of any other country with the pretensions of a Great Power. In 1895 more than one-third of the children of school age attended no school at all. A physical backwardness goes hand-in-hand with this intellectual darkness. Out of 400,000 recruits some 190,000 had to be rejected as unfit for service. It may be that the standard of the Italian army is too high, but there must be something seriously wrong with the Italian race when such sweeping condemnations have to be made.

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THE following school story is taken from the *Queensland Educational Journal*: Notwithstanding the mixture of many nationalities, Australia is making a type of its own, and perhaps schoolmasters could furnish information as valuable as that of ethnologists in forecasting the future lines. A story in point: The inspector was examining the subject matter of the incident of King Alfred and the cakes, as told in one of our Readers. He wanted to know why the coffee and the wine and the cigars were not produced for the king's refreshment. Amongst many reasons, more or less to the point, a pupil advanced the convincing one that they did not know he was the king. This suggested a new line of inquiry, and the inspector asked why he did not tell them he was the king—a very interesting point in the story. Another pupil rose sublimely to the new departure by saying he would not tell them that for fear they would raise his board! His mother kept a boarding-house, and the young hopeful was filled with the spirit of the business.

DEPARTMENT OF SCIENCE AND ART OF THE COMMITTEE OF COUNCIL ON EDUCATION, LONDON, S.W.

Circular 377.
S.

SCHOOLS OF SCIENCE.

15th January, 1898.

SIR,—As it appears that considerable misapprehension exists with regard to the recent circular No. 354 to Schools of Science, I am directed by the Lords of the Committee of Council on Education to point out that there are now two forms of grants in aid of instruction in Science—the ordinary grants of old standing and the special grant for Schools of Science on a new plan, first promulgated in 1895. The special grant is higher than the ordinary grant; and certain conditions were from the outset attached to it. Thus, the Science and Art Directory, sec. 56. p. 42, states:—'A School of Science, as distinguished from a Science School or Class, is one in which the instruction is carried on methodically according to one or other of the courses laid down' in the Directory, or according to one specially approved by the Department: and 'no School of Science will be recognized as such . . . . beyond two years after its formation unless it has a fair proportion of students taking the Advanced Course.'

It is now stated that numerous Schools do not fulfil, and never expect to fulfil, one of the essential conditions upon which the institution of a special grant to Schools of Science was originally approved and are yet claiming the special grant for such Schools instead of the ordinary grant.

Notice has therefore been given to the Inspectors of the Department to report on all cases where the students leaving at the end of the first year or at the end of the second exceeded 25 per cent. When these reports have been received, My Lords will be in a position to judge how far the condition above mentioned is not fulfilled and how far it should be enforced. They have no desire to press unduly, by any hard and fast rule of percentage, on those Schools which may, if time be allowed them, establish themselves as Schools of Science, when it is clear that there is a *bonâ fide* effort to make them such.

It appears, however, from several of the memorials which have been received that the memorialists themselves do not contemplate in many of the Schools, which it is desired that the Department should continue to recognize as Schools of Science, the possibility of there ever being 'a fair proportion of students taking the Advanced Course.' And they argue against the withdrawal of the special grant for a School of Science, as if such withdrawal left the Schools without any aid from this Department. This is not so: all the subjects forming the Elementary Course of the School of Science can be taught to precisely the same class of student in an ordinary Science or Art School or Class; and grants can be earned for that instruction, without the creation of a School of Science, in the same form as in a School of Science, *i.e.*, on attendance. These grants are large though not on so high a scale as in a School of Science, and it must be remembered that according to sec. 5. of the Directory the grants of this Department are 'to supplement and not to supersede local effort.'

The only justification of a grant higher than the ordinary one is that the School which receives it should fulfil conditions which are not required from ordinary schools and classes. Whether the conditions required should be in any way modified can only be properly considered when the information called for has been obtained.

I am, Sir,
Your obedient Servant,
J. F. D. DONNELLY.

DEPARTMENT OF SCIENCE AND ART OF THE COMMITTEE OF COUNCIL ON EDUCATION, LONDON, S.W.

(Telegraphic address, 'Science Art, London.')

Circular Letter 371.
Art.

SUCCESS IN SCIENCE SUBJECTS I. AND III.

In connection with Art Master's, Art Class Teacher's, and Elementary Drawing Certificates.

January 1898.

SIR,—I am directed to inform you that, in accordance with Section XX. (SCIENCE), page 14, Directory 1897, the success 'Pass' in Science Subjects I. and III. is superseded by two grades of success, viz., 'First' and 'Second Class.' This modification bears upon the requirements for the Art Master's, Art Class Teacher's, and Elementary Drawing Certificates in regard to which the word 'Pass' in the Elementary Stage of both Science Subject I. (Practical Plane and Solid Geometry) and of Science Subject III. (Building Construction) on pages 277, 278, and 284 of the Science and Art Directory (revised to August 1897), should read 'FIRST CLASS.'

I am to request that you will inform the teachers and students of your school or class accordingly.

I am, Sir,
Your obedient servant,
J. F. D. DONNELLY.

UR·CLASS·ROOM·AIDS·

Schemes for a series of Object Lessons for Standards I., II., and III., based upon the Courses suggested in the Code, will be inserted in next month's 'Practical Teacher.' These Lessons will be worked out in detail from time to time.

Concurrently with their appearance a series of BLACKBOARD ILLUSTRATIONS to suit these Lessons will appear in the 'PRACTICAL TEACHER'S ART MONTHLY.'

NOTES OF A LESSON ON COCOA AND CHOCOLATE.

BY WILLIAM DONE, B.A.,
Head Master of the Pupil Teachers' School, Brighton.

Apparatus—The Diagram accompanying this issue of the 'PRACTICAL TEACHER,' also Map of the World.

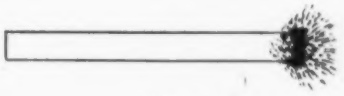
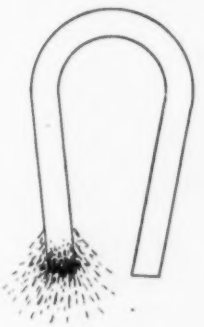
HEADS.	MATTER AND METHOD.
I. *Description of the Plant.*	Confusion sometimes arises in Children's minds between the well-known and much enjoyed fruit of the cocoanut palm and the substance which produces the beverage cocoa. The cocoa or coker-nut palm grows perhaps to a height of 100 feet, with the usual feathery compound leaves (sketch one), while the plant which produces cocoa is something like a cherry-tree, and has the very beautiful name of *Theobroma Cacao*, the first part of which means—food of the gods.
(*a*) Leaves.	Diagram I. gives us a good idea of the actual size of the leaves of this plant. They are coloured dark green, like the leaves of so many evergreens, and are of a pointed oval shape, and not notched or serrated.
(*b*) Flowers.	Looking carefully at the diagram we notice the flowers spring carefully from the stem, and not from a separate stalk, so they are called '*sessile*.' They are very small and white, quite out of proportion to the size of the tree and fruit. Fortunately we can see the shape better by enlarged diagram 2.
(*c*) Fruit.	The fruit we see is large (diagram 1, 3, 4). The shape is oval, and the outside ribbed and warty-looking. (Let a child measure diagram 4). The fruit is first green, and when ripe it is yellow or partly red. Inside the rind is a soft pinkish pulp, and imbedded in this are the seeds arranged in five rows, as we see by diagram 3.
	From counting these in diagram 3, we should suppose there were about 50, which is a fair conclusion. The seeds or cocoa-beans are somewhat almond-shaped, inclosed in a husk. (Diagram 5, 6, 7).
II. *Its Geographical distribution.*	South America, Central America, and the West Indies are the native homes of the Cacao tree.
	In these places it grows wild, but is also cultivated in great plantations. It has even been transferred successfully to Ceylon, Java, and the West Coast of Africa.
	Very fine Cacao is grown in Nicaragua, from which excellent chocolate is obtained.
	We notice that all these places are tropical districts. The tree wants great heat and much moisture to come to perfection. If, however, it is too much exposed to the direct rays of the sun the plant does not flourish, hence it is the custom to grow it beneath the shade of broad-leaved trees, such as the banana.
III. *Its Commercial importance.*	Who first discovered the nutritive value of Cocoa we do not know. The Spaniards found it in use in America when they first went there, and it still forms the ordinary breakfast of the natives of those parts The preparation Chocolate is largely consumed in France, Spain, and the Latin countries generally. Even in England, though not a rival to tea and coffee, still Cocoa is imported to the extent of millions of pounds avoirdupois.
IV. *Preparation of Cocoa.*	Cocoa is chiefly imported in our country as we see it in diagram 5, that is, the bean with the husk. The seeds are roasted so as to develop the well-known flavour or aroma, as it is called.—Compare this with the roasting of Coffee.
(*a*) Cocoa-nibs.	After roasting, sometimes the beans are simply crushed and called *cocoa nibs* (show some). Some people prefer their beverage made from the nibs, but they take a considerable time to boil, and if the liquid be allowed to stand and cool we notice a layer of fat on the top. This is a heavy white-looking substance (see diagram 9), and is rather indigestible. About 50 per cent., that is, one half, of the bean is fat.
(*b*) Flake cocoa.	Sometimes the whole bean, husk and all, is ground up between hot rollers, and called *flake cocoa*.
(*c*) Soluble cocoa.	As the fat of cocoa is rather indigestible it is sometimes extracted and the nuts ground to powder with a little starch added. This mixture is called *soluble cocoa*, and the beverage can be prepared by simply steeping it in boiling water.
	Cocoa differs much from tea and coffee in having but little stimulant action, but from the starch and sugar it contains it does possess some nutritive value, and may be classed as a food stuff and not as a simple stimulant.
V. *Preparation of Chocolate.*	Chocolate is made by first roasting the beans, when deprived of their husks, in an iron cylinder with holes in it for the escape of the vapour. The beans are then ground to powder, mixed with sugar and flavoured with vanilla and brought to a paste.
Vanilla.	Vanilla is a plant belonging to the natural order of the Orchids. It grows in the tropical parts of South America, where heat, moisture and shade prevail. It derives its nourishment entirely from the atmosphere, its long trailing stem attaching itself to trees for support. Diagram 14 shows us the flower and leaf. The flowers are greenish yellow, mixed with white, but the part used in commerce as a flavouring agent is the pod (diagram 15). This is about eight inches long. After careful preparation, these pods are dried and sent to market carefully packed, so that the flavour may not be dissipated. They are then cut into little pieces and ground with sugar.

HOW TO TEACH MAGNETISM AND ELECTRICITY AS A 'SPECIFIC SUBJECT.'

These 'Notes' will cover the course laid down in Schedule IV. of the Code. Every lesson has been verified by actual experience, and as far as possible the illustrations will be original and the apparatus suggested inexpensive or home-made. It will be found one of the most useful and attractive subjects in Schedule IV. With the aid of these Notes and a small text-book no teacher need fear to take up the subject.

MAGNETISM—Lesson 1.

Apparatus required: A lodestone, a pair of bar magnets, a pair of horse-shoe magnets, a common flour dredger full of iron filings, and a number of small objects as named in the lesson. The magnets will last for many years if wiped after each lesson and put away with the keepers on them.

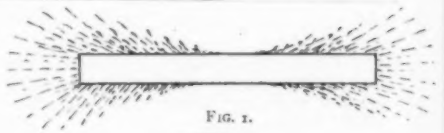
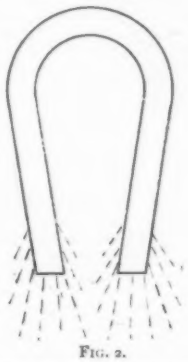
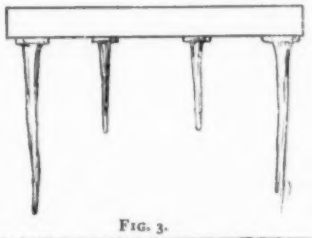
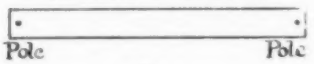
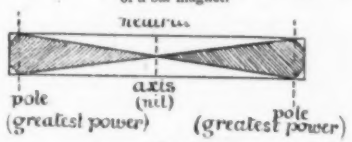
Heads.	Matter and Truths Taught.	Teaching Methods.	Diagrams as Illustrations.
I. Kinds of Magnets.	1. The *Natural Magnet*, or *lode-stone* (named from *lode* = to lead), is a mineral ore possessing the property of attracting iron. Shown by picking up iron filings. 2. An *Artificial Magnet* is a bar of steel to which the same property has been given. It may be straight (bar) or curved (horse-shoe). It will pick up iron filings.	1. (*a*) Scholars should handle and inspect, and point out resemblance or otherwise to ordinary iron ore. (*b*) Dip it in the iron filings: effect to be observed and stated by the class. 2. (*a*) Dip one end of bar and horse-shoe magnets into iron filings, and it may be noted that all three act in same way but in varying degrees. (*b*) The differences of shape are matters for observation. At this stage they may be pointed out, but no reasons need be assigned.	 FIG. 1.
II. Attraction of Magnets. Truth.	1. This power of attraction extends only to objects made of steel or iron. Thus a magnet will attract:— A needle but not a pin. A pen but not a pencil. A penholder but not a penstick. A knife blade but not the handle. A steel knife but not a silver one. A steel screw but not a brass one. A clock spring but not a coin. A nail but not its brass head. 2. *Magnets attract objects made of steel or iron, but do not attract anything else.*	(INDUCTIVE EXERCISES.) 1. (*a*) Have the various objects displayed on the table. (*b*) Let one scholar at a time try the action of the magnet (bar or horse-shoe) with the objects in order. (*c*) Make two lists, both on table and in writing on blackboard, according as magnet attracts object or not. (*d*) Let the *material* of which object is composed be stated, and two classes made as before. 2. The scholars will now be ready to *state* this truth. (DEDUCTIVE EXERCISES.) The class may now suggest other objects the magnet will attract or not. Let the reason be given and the truth verified by experiment in each case.	 FIG. 2.
III. Simple Application.	1. A magnet is used by metal-workers to separate brass and iron filings. 2. Edison's invention for separating particles of iron from the ore in lieu of blast furnaces is based on same principle. Ore is crushed and made to pass over the ends of powerful magnets. The iron particles are *held*; the earthy matter falls away.	1. Mix some of brass and iron filings on a sheet of paper. Draw the horse-shoe magnet slowly over the surface. Let scholars examine the filings on magnet and paper. Repeat the experiment until separation is complete. 2. If as much of this operation as may be *new* to the class be described, there will be no difficulty in applying their knowledge to the principle of the invention.	BLACK-BOARD SUMMARY. 1. Magnets are Natural (lodestone) or *Artificial* (Bar or Horse-shoe, made from steel). 2. They all pick up iron filings (see Figs. 1, 2). 3. They only attract steel or iron. 4. Applications:— (*a*) Brass and iron filings; (*b*) Separation of iron from the ore.

BLACK-BOARD SUMMARY.—This should be copied by the children in their Note Book and used afterwards to aid them in reproducing the Lesson in their own words.

All Drawings made during the lesson should also be copied.

MAGNETISM—Lesson 2.

Apparatus.—Magnets, Iron Filings, Nails of varying length.

Heads.	Matter and Truths Taught.	Teaching Methods.	Diagrams as Illustrations.
I. Experiment with Iron Filings.	1. Iron filings, when sprinkled on a magnet, (*a*) Cling in bunches at the ends ; (*b*) Diminish in number towards the middle ; (*c*) Disappear at the centre of magnet ;	1. Lay horse-shoe and bar-magnet on sheet of paper ; dust iron filings with dredger all over them ; lift up the magnets, and ask scholars to state what they observe. This should bring out statements *a*, *b*, and *c*, after careful inspection.	 FIG. 1.  FIG. 2.
II. Experiment with Nails.	1. A magnet which will just support a heavy nail near the end will support a lighter one a distance from the ends, but will not support any near the centre.	1. Place a bar magnet on a stand. Find the heaviest nail it will support near end ; try the same nail on other parts of the magnet. Find the nail that can be supported a short distance from the end. Try centre with smallest nail possible. (Fig. 3.)	 FIG. 3.
III. Truths to be learnt.	1. The lifting power of a magnet is greatest near the ends. 2. The points where it is greatest are the two *poles*. 3. The poles are for practical purposes equal in strength. 4. The lifting power is *nil* at the centre. 5. A line across centre is called the neutral axis. 6. Magnets are often painted the greater part of their length. The reasons are— (*a*) The painted part is useless for experimental purposes. (*b*) The magnet is better to handle. (*c*) It prevents rusting.	1. This may be questioned from preceding experiment. 2. This new matter must be told and written down. (Fig. 4.) 3. A rough comparison is possible from the above experiment. 4. This is an easy inference from the experiments. 5. New matter to be told, written down, and illustrated. (Fig. 5.) 6. The pupils may have noticed this, and possibly have asked the reason. (*a*), (*b*), and (*c*) may now be questioned from the class. It would have been out of place to give any reason at an earlier stage.	Position of Poles *near* the ends.  Pole Pole FIG. 4. neutral axis FIG. 5. Diagram to illustrate the distribution of lifting power of a bar magnet.  neutral axis (nil) pole (greatest power) pole (greatest power) FIG. 6.

BLACK-BOARD SUMMARY.—1. Experiments with iron filings. 2. Experiments with nails. 3. Truths we have learnt : (*a*) Lifting power greatest at ends ; (*b*) Lifting power *nil* in centre ; (*c*) Number and position of poles ; (*d*) Strength of two poles compared ; (*e*) Neutral axis ; (*f*) Why magnets are sometimes painted.

MANY BEAUTIFUL COLOURED OBJECT-LESSON SUPPLEMENTS

Are in preparation for presentation with the Numbers of the 'Practical Teacher' for 1898. These will be accompanied by the most complete 'Notes of Lessons.'

☞ **Will our readers kindly make this known to their professional friends?**

THE PRINCIPLES AND PRACTICE OF CLASS TEACHING.

I.—ARITHMETIC.

Its Importance.

ARITHMETIC, like all other subjects of the school curriculum, has two distinct purposes to serve—(1) **use in after-life,** and (2) **mental training.** Its use is evident. Every person has more or less frequently to perform numerical calculations, if it should only be counting his change when making a purchase. But it may be noted that a very small proportion of our pupils will ever be called on to use more than a very few of the numerous and elaborate 'rules,' in learning which they spend so much time, and which require so little time to forget.

As to mental training, arithmetic has been rightly called the mathematics of the common school. The mental discipline is **unique in kind.** No other subject develops quite the same faculties and habits of mind. Thus it happens that individual **pupils differ in their attainments in arithmetic** more than in any other subject of study. And it is to be remembered that there is no subject in which the mental training to be aimed at is so entirely missed if the teaching is not intelligent and systematic.

Time devoted to Arithmetic.

No other subject usually receives so much time in the common school time-table. **This can scarcely be justified by the importance of the subject either for practical utility or even for mental training;** but it is undoubtedly necessary if all pupils, varying so much as they do in the arithmetical or mathematical faculty, are to meet the requirements of prescribed examinations. Few of the rules required, and still fewer of the complicated problems under these rules, have any practical value beyond these examination requirements; and even as to their disciplinary value opinions may well differ. Practical value they may have, of course, for clerks, book-keepers, accountants, and the like; but it is to be hoped that only a few of our pupils are aiming at such employments.

Early Conceptions of Number.

The child's earliest conceptions of number arise from the **counting of real things.** All training, therefore, should be **by means of the concrete.** This process, however, carries us only a very short way, and is merely introductory to the abstract science of numbers. **The facts learned by actual counting, therefore, should be very soon put into the abstract form of figures,** and the processes first learned and practised with concrete things should next be practised with abstract figures, the abstract result being again verified by reference to the concrete. For example, the fact that two and two make four should be discovered by the pupil through some concrete form of counting, such as may be done on the ball-frame. But having once learned this as a fact, **it should be remembered** for future use, so that when the figures 2 and 2 are set down to be added, the pupil is able to set down 4 as the result, without going anew through the process of counting up the things. **This is where the essential difference comes in between counting up and adding:** the one is an actual operation with objects, appealing to the senses of sight and touch; the other is an abstract mental operation, depending on the exercise of memory and reasoning.

> This points to one obvious deduction as regards the things to be used in the concrete counting stage. They should *not* be things which the pupil has constantly at hand for reference, such as his own fingers. They should be things which can be removed at the teacher's discretion. Otherwise the pupil will be tempted to avoid making the transition to the abstract reasoning which is the essence of arithmetical calculation. The difference is like that between wading and swimming, and there will be a strong temptation to avoid making the necessary plunge so long as the firm bottom can be reached at will.

Gradation of Steps.

It is of prime importance that the steps we make in the teaching of number should be **graded with extreme care,** and no attempt made to advance more rapidly than the pupil can easily and surely follow us. Returning to the simile used in the preceding section, we must not expect the young swimmer to learn the art in rough water, or to continue the exercise beyond the time which suits his undeveloped powers. If we do, he will assuredly try to return to wading as the easier mode of progression. Much of the **counting by units** which is often seen instead of addition is due to the teacher's anxiety to make **rapid rather than sure progress,** and so requiring his pupils to perform exercises to which their powers of abstract reasoning are not equal.

Initiatory Lessons.

The first lessons are necessarily designed to teach the pupil the **meanings of the terms** *one*, *two*, *three*, etc. A very young child cannot tell whether *eight* or *nine* is the larger number, because he does not know the meaning of either term. This teaching of the meaning of our names for numbers is what we mean by counting. The first step will consist in teaching the pupil to **count up to ten,** so that if presented with any number of objects not more than ten he can tell how many there are by counting them. The time required even for this elementary exercise differs very much among children who are otherwise nearly equal in mental power. In this practice the pupil acquires **the idea of greater and less** among these number-names, so that he can tell that nine is greater than six, being higher up the scale, though he does not as yet know by how much it is greater.

The next series of exercises is designed to enable the pupil to answer the question just suggested—how much nine is greater than six. These exercises should be a **series of lessons on each number in turn,** analyzing it into the various groups of which it may be regarded as consisting. Beginning with two, he learns that it consists of one and one, or two ones; that one and one make two; and that one taken from two leaves one. Three he learns to be a group of three ones, or of one and two, or of two and one; and also that one taken from three leaves two, and two taken from three leaves one. In this way he learns the composition of all the numbers up to ten, but not all in one lesson. **The teaching must proceed no faster than the pupil can follow with complete understanding, and no faster than he can remember the results when the objects are removed.**

> The results of these number lessons must not only be understood but *remembered*. There is no use in trying to spare the memory in the teaching of arithmetic. The objection to the old addition tables and such expedients is not that they appeal to the memory *alone*. The difference between cramming and educating lies here. To remember without fully understanding is cram. To understand first, and therefore remember, is education. To understand and then forget is not indeed cram, but it is certainly not education.

Notation.

The next step is to teach notation—not the notation of hundreds, or even tens, but of the **numbers with which the pupil is now familiar.** He must learn to recognize and to make for himself the signs which we use for numbers, the **figures or digits.** Then the same exercises are to be gone through with figures that have already been performed with the ball-frame and also mentally. Some teachers prefer to combine this with the preceding exercises; but in arithmetic, if anywhere, it is desirable to attempt only **one thing at a time.**

Following this exercise, the pupil may be required to extend his power of counting up to 20, 50, or as far as desired. After twenty the counting is easy, as it proceeds on simple principles of analogy.

The pupil's acquaintance with notation must be similarly extended. The only difficulty here is the **principle of local value**—that a 2 in the second place means twenty. It is well to use some simple apparatus for this purpose, such as small sticks tied up in bundles of ten. Then the pupil sees that digits put in the second row mean bundles of ten, while those in the first row mean single sticks. The explanation must not be too elaborate, only enough to illustrate and justify the

principle. The actual use of the principle must be made familiar by requiring the pupil to write down frequently the numbers, say from 10 to 20, or 20 to 30, so that by frequent practice he learns to remember the meaning of a combination like 23 as easily as he remembers the sound of a given printed word.

Addition.

The teaching of addition—that is, **the adding of abstract numbers, as distinct from the counting of groups of things**—must in the first place be in the form of **mental practice.** The results of counting on the ball-frame have to be **remembered,** and in order to be remembered they must be **classified.**

The basis of this classification is the fact that certain results are **easier to remember than others.** Thus children very easily remember the doubles of numbers, 1 and 1, 2 and 2, 3 and 3, etc. Again, they find it fairly easy to remember the constituents of 10; and as this is one of the most important means of securing correct addition and subtraction, a good deal of time may be spent on it. The pupils should be able to give with great ease the complement of ten when any number is mentioned, as '2 and what make 10?' From these two principal series of results the children can easily reason out, **without counting,** the sum of any two digits—that is, they can add up to 18 or 20; but at first they should not be asked to deal with digits greater than 5 or 6. In order to get addition done by reasoning rather than by counting, one other kind of practice may be very serviceable—that of giving rapidly the number which is 'one more,' 'one less,' 'two more,' or 'two less,' than any given number.

> With these equipments the pupil can solve the problem of '4 + 5' by thinking of '4 and 4,' and then making his answer 'one more;' or of '5 + 5,' and making his answer 'one less;' or again, as 4 + 6 are 10—a fact which he should never be able to forget—4 + 5 must be 'one less,' or 9. It is immaterial which of the three roads the teacher advises his class to follow; but the fourth road, that of counting up by units after 4, '5, 6, 7, 8, 9,' *must be avoided at any cost.* This false method is so easy at first that nothing will prevent children following it except teaching them one quite as easy and much shorter.

Similar problems have next to be put down on the blackboard, and wrought by the children, in order that the work on the board, and afterwards on the slate, may be seen to be exactly what they have already been doing mentally.

It is important in the early stages of arithmetic to **keep the mental work well in advance of the slate work.** To an older pupil the slate is an aid to calculation; but to a beginner the making of the figures itself is a difficulty, and the operation of **slate working makes the calculation less easy.** Hence the need for giving on slates somewhat easier problems than the pupils can solve mentally.

When the little addition sum reaches three or more figures in height, and the answer becomes more than 10, the writing down of that answer must be carefully explained, so as to form a foundation for instruction in 'carrying.'

The next difficulty in addition is that of 'carrying,' which arises when more than the units place is occupied by the lines to be added. **Columns** should be made for the units, tens, and hundreds, and each name kept to its own column. The principle may be sufficiently illustrated by comparing each denomination to **things of different kinds,** such as apples, oranges, etc. Then, as it is impossible to add 3 apples and 2 oranges together in one sum of either name, the class will see the necessity for keeping units and tens in different columns, and adding them separately.

In the teaching of carrying, arrange a sum so that the units line gives an answer of more than 10—say 14, as in the example given. Now we may speak of 14 units, but cannot write them down; we cannot write more than 9 without using the tens column, so the 1 ten goes in the next column. Adding the tens we get 12, but we can only write the 2 in its own column—the 1 is hundreds. So from the units we get 1 ten and 4 units as answer; from the tens 1 hundred and 2 tens. Putting these together, we get 1 hundred 3 tens and 4 units.

	5 3 4	7 5 2
1	1 2	4
1	3	4

The next step is to show that the 1 ten can be added in along with the figures in the tens column, and thus we get the answer at once. Most teachers find it useful to require the carried figure to be written down. If written down as a very small figure, just beneath the right-hand corner of the 4, but above the line, it will be at once in the proper place for adding, and will not be rubbed out, so that it will remain while the pupil goes over his sum again to verify his answer. Some write the carried figure at the top of the line, which is less natural.

It is assumed that the same illustration of carrying, if needed, will be extended to the hundreds and other columns, and that the notation or writing down, and the reading off or **numeration,** of numbers will always keep pace with the extension of the addition sums to three or more columns. By-and-by the vertical lines can be dispensed with.

So far as addition is concerned, the rest is all practice. **Rapidity and accuracy together, and neither at the expense of the other,** must be the teacher's aim. And in order to get both or either, constant care must be given to method, in order to make sure that the pupils are really adding, and not counting up by units.

> For fluency in adding larger numbers, several kinds of drill may be given. Counting up by tens is one kind. Such a series as 10, 20, 30, 40, etc., or 11, 21, 31, 41, etc., or 4, 14, 24, 34, 44, etc., should be run up by the pupils as required. Nines and elevens may be used in the same way, in the first case the units figure always decreasing by 1, as 4, *13*, *22*, *31*, 40, 49, etc., and in the other increasing by 1, as 4, *15*, *26*, 37, *48*, etc. Another kind of series may be used to impress the fact that in adding, say, 17 and 8, only the units 7 and 8 need be added; thus 8 or any digit should be added to 7, *17*, *27*, *37*, *47*, etc., as rapidly as the teacher can mention the series.
>
> Longer and more rapid additions are much assisted by giving abundant practice on the blackboard or on printed wall-sheets, and requiring the pupils to give results only for each addition, without mentioning the figures to be added on. Thus, if the column to be added is, say, '4, 7, 8, 3, 9, 6, 5, the pupil will only say, '4, 11, 19, 22, 31, 37, 42,' not '4 and 7 are 11,' and so on.

Addition is really the most useful rule of arithmetic, and probably the one **most used in actual life,** and also the rule in which **blunders are most frequent.** It is worth while to spend some care in making its acquisition as nearly perfect as may be. And for both rapidity and accuracy, oral and mental drill is the best training. For this kind of drill the teacher should use methods which do not entail any speaking by him, but only by the pupil. The long-drawn problem, beginning, 'I had 10 marbles in my pocket; I bought 5 more,' etc., etc., is of little or no practical use. A skilful teacher would have got round his class with an answer from each pupil before that kind of problem is even stated to the children. What is wanted is as much work as possible from the children in the time, and as little interruption as possible by the teacher's voice. Some teachers use large sheets of figures, which only require the teacher to guide the pupil's eye with the pointer as to where he is to begin adding. A series of figures arranged in a circle on the blackboard or on a printed sheet affords scope for either long or short additions, at the teacher's discretion.

A word must be said as to **the use of 10** which some teachers make in addition and other rules. In adding 6 and 7 they break it up into 6 and 4 = 10 + 3 = 13, instead of 6 + 6 = 12 + 1 = 13. So 29 and 4 would be 29 + 1 = 30 + 3 = 33. The next ten is always made the halting-place, and the success of the method depends on the facility with which the pupil can make up the 10 from the number to be added, and add the remainder. Many teachers use this plan with the best results; and those who may not like it will probably find that any rational method will produce results as good if only taught as intelligently and adhered to as systematically and thoroughly. It is *method* rather than *a method* which tells.

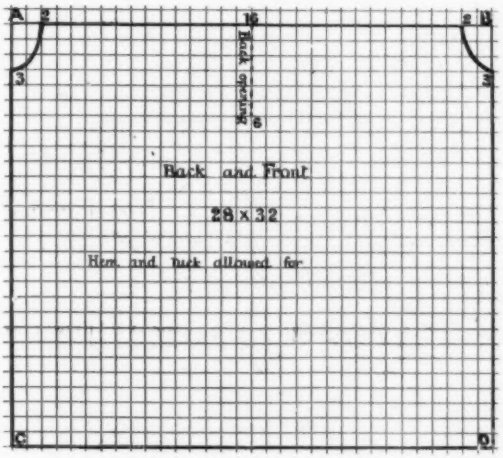
INSPECTION QUESTIONS in all Subjects will from time to time appear in our columns.

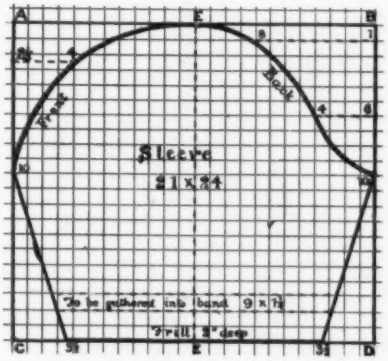
NEEDLEWORK FOR PRACTICAL TEACHERS.

By the Author of 'Blackie's Manual of Needlework.'

WHILE THESE NOTES ARE WRITTEN SPECIALLY TO MEET THE REQUIREMENTS OF CERTIFICATE CANDIDATES, THEY WILL BE FOUND USEFUL BY ALL TEACHERS WHO HAVE TO PREPARE FOR EXAMINATION IN THIS SUBJECT.

A.—Child's Overall.





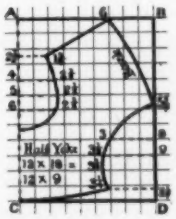


FIG. 1.

B.—Seams for Overalls.

Topsewing (if the selvedges are strong and even), sew and fell, run and fell, counter-hemming, mantua-maker's and French seaming are generally used for overalls.

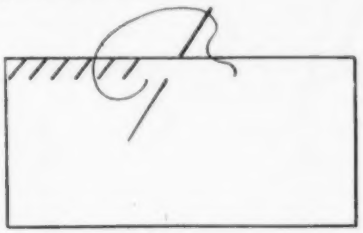


FIG. 2.

For the French and mantua-maker's seams see p. 266 of the November number of this Magazine.

C.—Overcasting.

Overcasting is used to prevent raw edges from fraying out. There two methods of overcasting seams (see Figs. 2 and 3).

Overcasting as done in Fig. 2 is simply *seaming* or *topsewing* the two raw edges together after they have been carefully trimmed.

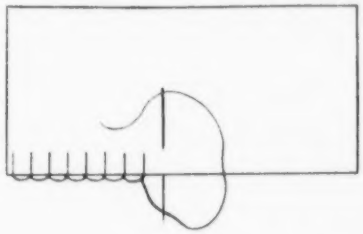


FIG. 3.

The only *difference* is that in overcasting you begin at the *left-hand* side instead of the right, and that a rather large space is left between the stitches.

The stitches should be about $\frac{1}{8}$ of an inch in depth, and not too close, as from six to eight stitches to an inch are amply sufficient.

The second method (see Fig. 3), though sometimes called overcasting, is generally known as embroidery, scalloping, or blanket stitch. It is used for overcasting serge materials as well as print. Be careful not to draw the thread too tightly, or the raw edges will get rolled into a ridge.

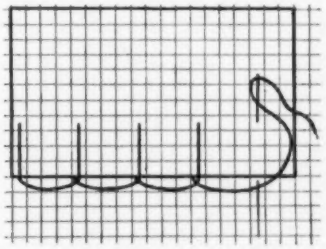


FIG. 4.

If used for *overcasting* the stitches should be from $\frac{1}{4}$ to $\frac{1}{8}$ of an inch deep, and the same distance apart; when used for *edging blankets* they should be from $\frac{1}{4}$ to $\frac{5}{8}$ of an inch deep and apart (see

FIG. 5.

Fig. 4); when used for embroidery they should be quite close together, and the size will vary according to the depth of the scallop (see Fig. 5.)

D.—Counter-Hemming.

Counter-hemming is a perfectly flat seam used for straight and curved seams of pinafores, shirts, etc. It is specially useful when garments are to be machine-stitched or for garments to be made up by hemming alone in infants' schools or Standards I. and II.

1. Turn down the raw edges of the two widths to be joined, one on the *right* side and one on the *wrong* side, with a fold ⅛ inch in depth. (The fold may be ¼ or ½).

2. Lay these folds one above the other as in Fig. 6, so that the raw edges are completely hidden.

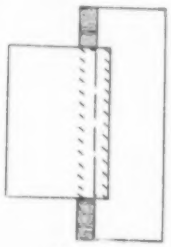


Fig. 6.

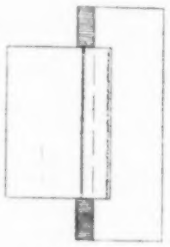


Fig. 7.

3. Finish by either hemming one fold on the right side and the other on the wrong side, as in Fig. 6, or by stitching two rows on the *right* side, as in Fig. 7.

N. B.—In Fig. 6 one piece of material is *purposely* made shorter than the other.

Exercises for February.

First Week—
1. Draw the diagram of a child's overall (½-inch scale).
2. Write out directions for making up garment.

Second Week—
1. Work three inches of each of following seams :—Run and fell, mantua-maker's seam, French, and counter-hemming.
2. Make two loops and sew on two buttons by different methods.

Third Week—
1. Cut out and tack together half the front and half the back of a child's overall.
2. Show how to make the placket on the back of a child's overall.

Fourth Week—
1. On a piece of calico, 6 × 6, show two inches of each stitch required for making up an overall.
2. Mark in cross-stitch W, X, Y, Z.
3. Draw the diagram of the sleeve of an overall (½-inch scale).

A.—Openings in Nightdresses.

The opening in front of a nightdress is generally the length of the collar band ; the false hems must be rather longer to allow for turnings, etc.

There are various methods of finishing them. The *simplest* way is to make the slit exactly in the centre of the garment and finish it by two false hems—an *upper* and an *under* one of *exactly the same width*.

The upper one in ladies' garments is on the *right*-hand side when the garment is *on the person*, and on it the buttonholes are made ; the under one is for the buttons, lies on the *left*-hand side, and must be from ½ to ¾ of an inch *longer* than the upper one.

Suppose the opening is to be 16 inches long. Take two pieces of calico or other material ; one piece 16½ by 1¾ ; the other piece for the under hem will be 17 by 1¾.

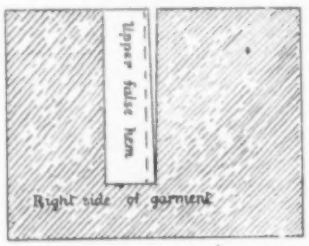


Fig. 8.

Place the 16½ inches false hem with its *right* side downwards on the *right* side of the garment along the edge of the slit (see Fig. 8), the overlapping parts to be half at the foot and the other half to be at the top for the slight curve of the neck.

Run and stitch or stitch this false hem over to the wrong side, and having laid down a fold ½ of an inch deep, hem it down. In order to get it to lie flatly a horizontal slit must be cut at the foot of the opening as far as the stitching which fixes the false hem to the garment (see Fig. 9).

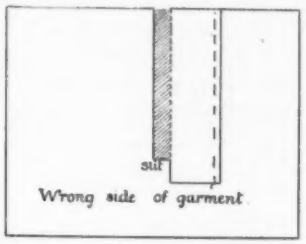


Fig. 9.

Finish the left-hand side in the same manner.

Now make a slit *half way* across the *upper* part of the left-hand

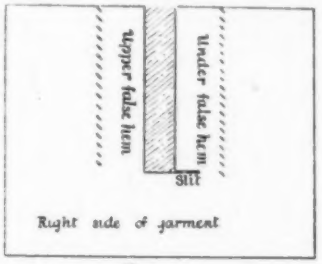


Fig. 10.

hem (see Fig. 10) to allow the right-hand or *upper* false hem to fold over and lie flat above the *left*-hand or under one.

This folding over of the *upper* false hem above the under one will make a fold or pleat in the skirt running in a line with the upper false hem (see Fig. 11).

Fig. 11.

Seam the two hems together *above* the slit and then hem down the projecting piece of the under false hem to cover and protect the edges left after cutting across this opening. Or the edges may be

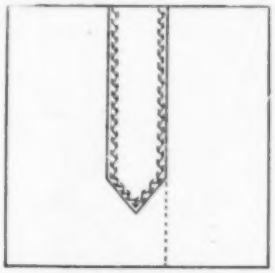


Fig. 12.

protected and neatened by a straight strengthening tape. This upper false hem may be finished by stitching or any other ornamental

stitch. If preferred, the hem of the right-hand slit might be run and stitched or stitched on the *wrong* side of the opening, turned over on to the *right* side, and then stitched or feather stitched (see Fig. 4). Or embroidered edging might be eased on all round this hem, a strip of insertion be placed above it, and then finished with feather-stitching. The bottom part might also be turned into a point as in Fig. 12.

Other methods will be taken up afterwards.

EXERCISES FOR FEBRUARY.

First Week.

1. Draw the diagram of the collar, yoke, and sleeve of a woman's nightdress (½ inch scale).
2. Make up a piece of calico 9″ × 9″ as the under part of a sleeve for a nightdress.

Second Week.

1. Cut out in lined paper and make up (by tacking) half the front and half the back of a woman's nightdress (½ inch scale).
2. On calico 6″ × 6″ show two inches of each stitch required in making up a nightdress.

Third Week.

1. Make up and stitch a band of calico 3″ × 1½″, and make and set on a muslin frill.
2. Darn a hole (common method) on stocking-web material.

Fourth Week.

1. Write full directions for making up a woman's night-dress.
2. With a piece of flannel 6″ × 6″ and 1½ inches of tape, make a placket and finish it with a straight strengthening tape at the foot.

'COMPOSITION THEMES AND MORAL TRAINING.'

A SERIES OF LESSONS PREPARED ON A NEW PLAN FOR THE UPPER STANDARDS.

BY B. ELDERKIN,
Model School, Westminster College.

☞ THE LESSONS FULLY MEET THE LATEST INSTRUCTIONS IN THE NEW CODE.

Hints for successful use of these lessons.

a. The subject matter may be *read* over by the teacher or even by one of the scholars, or, better still, the teacher may previously read it and give the substance to the class in his own words. He may thus at discretion introduce other illustrations or omit some of those given.

b. The blackboard summary may be put before the class if the teacher is short of time, or, what is much better, a similar one may be made up while the class is being questioned on the matter of the lesson.

c. The whole of the essay should be put before the class at the first lesson, but it will often happen that there will be sufficient matter for two or more written exercises.

d. It is not intended that these lessons should be used exclusively, but that they should form a part of every month's Composition work.

e. Keep the best exercises, so that the Inspector may see the plan upon which they have been worked, as well as the topics written upon, or have a separate exercise book for Composition.

LESSON IX.—ON CLEANLINESS.

1. 'Cleanliness is next to godliness' is one of the truest of proverbs. Cleanliness is one of Nature's first laws. The grass, which is designed chiefly as a food for animals, is one of the sweetest and most refreshing things the eye of man looks on. It will grow almost everywhere, and wherever it grows it is Nature's carpet to hide the barrenness and *dirt* of the ground.

The foliage and blossom of trees and plants derive their charm as much from their purity and sweetness as from their colour or scent. When we contrast the purity of vegetation with the soil in which it often grows, the effect is more striking.

2. If absolutely pure water is required, as it frequently is for medical and chemical purposes, it is usually *distilled;* but rain and dew, hail and snow, are all water distilled by Nature on a very large scale. Such water, therefore, is the purest obtainable if we could catch and store it without contamination. Snow especially is the universal emblem of purity.

3. This same law of cleanliness is stamped equally on the animal world. We expect the fishes to be clean, and very beautiful most of them are; but the birds of the air and the beasts of the earth are scarcely less so, and what is more remarkable, the millions of creatures, whose life is spent chiefly under the ground, do not appear to be any exception to the rule, for a mouse, a beetle, a mole, or a rabbit, seems to be almost as clean as a bird or a fish.

4. How does all this happen? Well, their outer covering is *designed* for cleanliness—it is difficult to make it dirty. Then, again, most of these creatures spend a considerable part of their time in cleansing their coat, as though a state of dirt were disliked by them; and many of the land animals and birds make regular pilgrimages to pools or rivers for the purpose of taking a bath. But besides these things, Nature has provided for them her own shower-bath—*the rain.* We know how a shower of rain cleanses almost everything in our towns and villages, but it also effectually cleanses the myriads of living creatures which cannot get away from it if they would.

5. Should boys and girls, or men and woman, be the exception to this universal law of Nature? With them cleanliness ought to be a duty. It will help in placing a right estimate on cleanliness if we consider how much *pleasure* is derived from *seeing* it in *others,* and how impossible it is for us to secure the esteem of those whose good opinion we value if we live in the habitual neglect of it.

6. The importance of cleanliness in relation to *health* can scarcely be overstated. We might say, with almost perfect truth, that if we could get rid of impurity from the air we breathe, the water we drink, the clothes we wear, and from the houses, schools, and workshops we live and work in, we should get rid of most of the terrible diseases that are the dread of our life. In the year 1665 the Great Plague of London broke out, and over 100,000 persons were swept away in six months. We have had many epidemics of cholera, plague, and various forms of fever, which have resulted in the death of large numbers of people, but all these diseases are now less frequent and less deadly than formerly, owing very much to improved drainage, purer water, and cleaner streets and homes. These diseases are known by the doctors as 'dirt diseases,' and cleanliness is therefore the great enemy and preventative of disease.

7. Every boy and girl should know a little about that wonderful covering of their body—the skin. Its construction is so delicate, and the work it has to do is so important to health, that cleanliness of person cannot be neglected without the greatest risk. The skin is composed of two layers, the outer layer consisting of small, dry, scaly particles, which are constantly dying and falling away, to be replaced by others. Regular washing and friction assist this process, and so keep the skin not only clean but healthy. Every one has noticed that after violent exertion the skin is covered with perspiration. Now this is only another name for dirt or impurity, which has been taken out of the blood, and which has oozed out through millions of small holes or pores found in every part of the skin. Even when we do not consciously perspire, the impurities of the blood are all the while being forced through the skin in other forms, chiefly as vapour. If the body were coated all over with a varnish which effectually closed all the pores, we could not live many hours. The pores are so small, that as many as 3,500 of them may be found on a square inch of the body. It is impossible to see them with the naked eye.

If we neglect the duty of regularly cleansing the skin, it is easy to see that large numbers of the pores must become choked up with the perspiration, the waste particles of the skin, and the dust from our clothing. The work of filtering out the impurities of the blood is thus hindered, and the result

is headache, loss of health, diminished power of work, and inability to meet and throw off attacks of epidemic or other diseases.

8. The clothing, especially the parts worn next the skin, must be constantly changed and cleansed, not only because dirty clothing interferes with the proper action of the skin, but impurities from the clothing may actually be *re-absorbed* after the skin has already gone through the work of expelling them.

9. We can now see how necessary baths are to health. The best form of bath for boys and girls is the swimming bath, not only on account of the healthy exercise it affords, and because life is often saved by their being able to swim, but also because it accustoms them from early life to love the water, and teaches them the delight that comes through cleanliness.

SUMMARY.

(*a*) The old proverb about cleanliness.
(*b*) The grass as Nature's carpet.
(*c*) Cleanliness of foliage and blossom.
(*d*) Cleanliness of the animal world.
(*e*) Pure water.
(*f*) How cleanliness enters into our happiness.
(*g*) Epidemics of 'dirt disease.'
(*h*) The skin—its scales, pores, and perspiration.
(*i*) Why these must always be *open*.
(*j*) Why clothing should be regularly cleansed.
(*k*) Advantages of baths and swimming.

CLASS LESSONS IN DOMESTIC ECONOMY.

BY ETHEL R. LUSH.

Author of 'Chats with Children on Domestic Economy,' Head Mistress of the Ipswich Higher Grade Girls School, and Organising Mistress to the Ipswich School Board.

STANDARD IV.

Lesson XV.

CLOTHING: USES AND PROPERTIES.

[*Apparatus required.*—Boiling water; small jugs and a saucer; two or three thermometers; pieces of fur, woollen, silk, cotton and linen.]

FOR some time past we have talked about food; now we shall make a change, and consider an almost equally important question—that of clothing.

Have you ever thought why clothing is so necessary to us? Yes, you say, we wear clothing to keep us warm. Quite so, but why do our bodies feel cold if left unprotected by clothing? That is what we shall endeavour to discover.

Look at this little instrument, it has been hanging on the wall year in and year out—you know it to be a thermometer, and that by its means we ascertain the temperature of the room. Here is another thermometer, the kind a doctor uses; this, you observe, consists merely of a thin glass tube with a dilated end called the bulb. Look closely at it and you will find a silvery thread of mercury rising from the bulb half-way up the tube and a series of figures beside it. The mercury stands level with the figure sixty in both thermometers, hence we say that the temperature of the room is sixty degrees. By plunging one thermometer into cold water and the other into hot water, a great difference in their readings is produced. The mercury subjected to cold water has fallen considerably, whereas that in the hot water jug has risen. It is easy to learn from this that mercury is affected by heat and cold, rising under the influence of the one and sinking when subjected to the other.

We find that the temperature of the room is sixty degrees; that of hot water is greater and that of cold water is less. Now let us see what is the temperature of the human body. If you place the bulb of the thermometer in your mouth, keep it there a minute or two and then take it out and examine it, you will find that the mercury has risen and stands almost half way between ninety-eight and ninety-nine, to be quite accurate at 98·4. This is marked in some thermometers as blood heat, and a person in health will always maintain this temperature, in summer and winter, in hot climates and cold climates.

You have learnt in earlier lessons that the heat of the body is maintained by means of warming or heat-giving foods. Now as we are constantly in need of this fuel-food, it follows that the body must lose its heat in some way. Here is a red hot poker just taken from the fire. Those of you who are near enough can feel heat from it striking against your faces. Heat is given out from the fire, from the sun, and, indeed, from every hot body in just the same way; and as the heat proceeds from the hot body in straight lines or rays until it strikes against some solid body, we call this propagation of heat by *radiation*. Observe that I said every hot body radiates heat, therefore our own warm bodies must give off heat; in fact it is by radiation that heat is largely lost from the skin.

But this is not the only way in which the body loses heat. Take hold of this piece of marble; it is cold and gives your warm hand a chill, and, by degrees, the marble becomes warmer and your hand colder, until both are the same temperature. This is called loss of heat by *conduction*. Then again the skin gives off heat by means of perspiration. When you are very hot you perspire freely, the perspiration evaporates into the air, and as all evaporation is attended by a reduction of temperature, the body is cooled.

Heat is lost also with the breath; the air breathed out is much warmer than the air taken into the lungs. The food and drink taken are frequently colder than the body, and heat is parted with in bringing them up to the proper temperature. From all this you learn that in many ways the body loses heat. Most of all, however, heat is lost from the skin, and it is with the idea of preventing as much escape of heat as we can that we cover the skin with clothing, just as we put a tea-cosy over the teapot, and wrap the hot water bottle in flannel.

Clothing, then, is worn *to keep in the heat of the body*. That is the principal reason, but there are other minor reasons for wearing it. Thus we wear boots and shoes on our feet to protect them from the thorns, flints and rough places which they must pass over: hats we put on our heads to shelter them from the sun and the rain; gloves are put on the hands when work is undertaken which may hurt them—as, for instance, the strong leather gloves worn by hedgers. Therefore we say that *clothing is worn for protection*.

The inhabitants of all countries are fond of decorating their persons. Savages, whose clothing is limited in quantity, wear bright beads and gay feathers. The earliest inhabitants of our own island home, who wore for clothing the skins of animals, stained their bodies with red ochre and blue woad juice: and we ourselves love pretty ribbons and sparkling jewels, and spend much time and forethought in selecting our summer dresses and winter costumes. We may say with truth, therefore, that *clothing is used for purposes of ornament*. This is perfectly legitimate, and even praiseworthy, if not carried to extremes. It is right to make the best appearance one can, but remember that outward show should not conceal inward poverty. A well-dressed person is one whose every garment is neat and good.

Clothing serves still another purpose.

Uncivilised races, we said just now, wear very little clothing, if the climate in which they live is hot, and clothing is not needed to keep in the heat of the body. But the civilised people who live in tropical countries all wear clothing, and as the natives become civilised they follow this example; thus *clothing serves as a mark of civilisation*.

Turn back your thoughts to the lessons you had in Standard III. You heard there of the various materials used for clothing, of which the principal are woollen, silk, cotton, linen, leather, fur, guttapercha, and indiarubber. These we may classify according to their source; those derived from the animal kingdom include wool, silk, leather and fur, whereas

cotton, linen, indiarubber and guttapercha are of a vegetable nature.

We may classify them, too, according to their properties. Let us see what this means.

Here is a kettle full of boiling water, some of which I pour into these two jugs of equal size, filling them so that there shall be the same amount of water in each; you are satisfied that both jugs contain equally hot water. One of them I shall wrap in a double thickness of flannel, the other is left uncovered. We will leave them for a few minutes and turn our attention to this piece of marble which some time ago I wrapped in a piece of fur. You know from experience that we wear fur-lined and fur-trimmed clothes when we stand in need of warmth. Let us see whether the marble is any warmer for its fur coat. No, it is just as cold as the uncovered piece lying on the table. Now we will examine our jugs of hot water. By dipping a finger first into the exposed jug and then into the one covered with flannel it is easy to ascertain that the water in the first is very much colder than that in the second. We learn from these two experiments that clothing does not make us warm, or the fur-covered marble would have become warmer, but that it keeps in the heat of a body already warm.

The different clothing materials vary in their power of preserving the heat of the body. Some allow the heat to pass very readily through their substance, others prevent it from escaping. To the former class we give the name of *conductors* of heat, or say that they are good conductors. Materials that prevent heat from escaping we call *non-conductors*, or bad conductors.

Another experiment will enable you to distinguish the two classes. This time we have five little jugs of water. They were filled at the beginning of the lesson with boiling water. One, you observe, is wrapped in fur, a second in flannel, a third in silk, a fourth in calico, and the fifth in linen. Dip a finger into each in turn, beginning with the fur-covered jug. This is what we find: the water in the first jug is very hot, so is that in the next, the third is not so hot, the fourth fairly cool, and the fifth quite cold. This tells its own tale—that fur, woollen and silk are bad conductors of heat, and cotton and linen are good conductors. If we touch a piece of fur, woollen, and silk, these materials feel warm; cotton feels less warm, and linen gives one a chill. This makes one inclined to think that some materials are warmer in themselves than others, and indeed it is commonly said that woollen clothes are warmer than cotton ones.

To show you that these materials have no warmth of their own, a few minutes ago I wrapped up two thermometers, one in linen the other in woollen materials, and if we now examine them we shall find that the mercury is at exactly the same level in both. Why, then, do some materials feel warmer than others? It is because the good conductors, such as cotton and linen, when in contact with a warm body such as your hand, rapidly conduct the heat away and your hand feels cold, whereas non-conductors such as fur and woollen, prevent heat from your hand escaping, and as a consequence you have a feeling of warmth. When you speak of a warm dress or cloak you will remember in future that it does not *make* you warm, but merely serves to keep in the heat you make for yourself.

There is still another point to consider in connection with the properties of clothing materials. Mention has been made of the perspiration which the skin is constantly giving off. Whether you are aware of it or not, perspiration is unceasingly poured out upon the surface of the skin. If we wear clothing which does not absorb moisture, the perspiration cannot pass away, and an unhealthy condition is the result. It is important, therefore, to wear clothing which will take up moisture. Such materials are termed porous. Here in a saucer is a little warm water in which I will dip a piece of fur. Observe that though the under surface is wet owing to contact with the water, the upper surface and the hairs are not wet at all, showing to us that water has not passed through the skin. Take next a piece of flannel and dip it in the water, it absorbs it rapidly. For this reason we should prefer to wear woollen material rather than the fur, even if the latter were not so expensive. Cotton and linen goods absorb moisture rapidly, but unfortunately soon become saturated, that is to say, they can absorb no more. These materials are, consequently, not good to wear next the skin, even apart from the additional reason that they are good conductors of heat. From what you have heard you will gather that woollen is the only material which it is advisable to wear next the skin. It is beneficial too in promoting the action of the skin by the friction its rough fibres set up. In some instances woollen is too rough for delicate skins, and silk underwear should take its place. But silk is expensive and not very durable, so it cannot be generally adopted.

SUMMARY.

Uses of Clothing:—

I. To keep in the heat of the body.
   1. Heat is lost from the skin—
      (*a*) By radiation.
      (*b*) By conduction.
      (*c*) By perspiration.
   2. By cold food and drink taken.
II. To serve as a means of protection.
III. As a mark of civilisation.
IV. For purposes of ornament.

Properties of Clothing.

Conducting materials allow heat to pass through, *e.g.*, linen and cotton goods.

Non-conductors do not readily allow heat to escape from the body, *e.g.*, leather, fur, woollen and silk.

Porous materials are those that readily absorb moisture, *e.g.*, woollen goods.

Non-porous materials do not take up moisture, *e.g.*, leather and fur.

NOTE.—Lessons on Materials of Clothing will be found in the PRACTICAL TEACHER for August, September, October and November, 1896.

THE INSPECTOR'S NOTE-BOOK.

BY AN INSPECTOR OF SCHOOLS.

THE TEACHING OF INFANTS, &c.

'A February face,
So full of frost, of storm and cloudiness.'
Much Ado About Nothing, Act V. Sc. 4.

'Are the Children attentive?' There is one test of the condition of a school which is all-important in these days of intermittent inspection. Are the children attentive when they are receiving instruction? The methods of teaching have, of course, to be taken into consideration. But yet there may be excellent methods and very inattentive scholars. To my mind, if a school is well disciplined, there is not much reason to doubt that the instruction will be efficient. In infant schools the teachers often do too much for the children. As they march out, for instance, some one stamps the floor and claps in order to keep them in step. Of course the babies are more or less helpless, but the first class should be thrown more on its own resources. All these things affect the order of a school.

* * * * * * *

Individual teaching is superior to simultaneous. It appears to me that less simultaneous work is needed in infant schools, and more individual instruction. Teachers can so easily be deceived when the children always read together. One or two bright ones lead, and the rest merely follow like sheep. I came across an instance of this the other day. It was the first class, and they read fairly, but all together. I took them individually, and found several who were unable even to sound their letters. Simultaneous work, too, conduces to inattention. The answers in an oral lesson should never be given simultaneously.

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Number for the Infants. To begin with, very little slate arithmetic at all should be done in the infant school. Not long ago I actually found little test cards being worked by first-class infants!

Cp. the circular issued Feb. 6, 1893. 'It is the experience of many good teachers that it is unnecessary before the sixth year is passed to do any formal arithmetic work on slates.' Number then should be treated, generally, orally. Variety is wanted in this subject more than in any other. It is admittedly the most difficult one of the curriculum. And so, do not pin your faith solely to the ball frame—an excellent piece of apparatus in its way. I know of schools where the children must almost abhor the sight of this article. Use the chalk and roughly sketch illustrations on the blackboard. Use coloured chalks. For instance, draw a plate and put some oranges on, a tree with apples on, or birds, a field with horses in, a pond with fish in, etc. Put numbers on the board, and let the children add them mentally. A good plan is to write 1, 2, 3, 4, 5, 6, 7, 8, 9, either in a line or in a circle. Point to the numbers indiscriminately, and let children add. Use books, pencils, beads, shells, and let individual children work sums in the concrete. For working little money sums use actual coins at first. Some publishers have brought out very good cardboard representations of the various coins.

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Reading for Infants. According to Circular 322, referred to above, books should not be used for infants except occasionally for a change of occupation. Again, 'Reading becomes a kindergarten lesson through pictures and word-building.' Rely largely on the blackboard, and go through a systematic course of word-building, finishing off with books at the end of the year. I am often asked whether I think word-building of much use. The great fault lies in the want of a proper system. Many teachers take their lessons in this subject in too hap-hazard a fashion. Either some good book should be followed or some thought must be given to the drawing up of lists of words, which, of course, must be graded from lesson to lesson. Care should be taken to have a graded system throughout the school. Let a junior teacher copy out a piece from a reading book on the blackboard for unseen work occasionally.

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Infant's handwriting. Writing is generally fairly well done. In some schools the elder children write in copy books with black lead pencils during the last six months of the year. The first things an Inspector looks for are proper pencils and properly ruled slates. In some schools short blunt pieces are used, and faintly ruled slates. How can the writing be satisfactory under such conditions? Use holders for the short pieces; they need not be thrown away. It is an advantage to rule the slates lengthwise. The babies ought not to use slates; trays of sand are preferable for them. The elder children should be able to copy from ordinary written or printed matter. Discourage rubbing out.

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Not more than 30 minutes at a time. It is surprising how many teachers still have long lessons. In the instructions to Inspectors we find 'The infant school contemplates in the length, variety, and character of its lessons, the training of scholars whose delicate frames require very careful treatment. It is essential, therefore, that the length of the lesson should not in any case exceed 30 minutes, and should be confined in most cases to 20 minutes.'

So much depends upon the arrangement of the lessons. The Kindergarten and needlework lessons may, of course, be a little longer. In the afternoon the more recreative subjects should be taken. Music had better be taken for about ten minutes every day.

Arrange plenty of rest and change for the babies. In fact, a separate time-table might almost be drawn up for these.

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A Word or two on Discipline. And now as to the discipline of the infants. Some teachers, when I have complained of the order not being what it should be, have told me that they do not believe in enforcing strict discipline. Others go to the other extreme, and expect almost military order. Very few teachers can do efficient work amid a babel of tongues. Attention there must be if the children are to learn anything. It is generally the quiet teacher who obtains the best order. It is a mistake for a teacher when she gives an order to go and help the children to execute it. The cane should never be a familiar article in the schoolroom.

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Infants—Object Teaching. Object lessons are not always well taken. It seems to me unsatisfactory to leave this subject to the junior teachers. Their work should be supplemented. Often too little time is given to object teaching; for instance, five hours are given to arithmetic and only one to object teaching. The subjects selected are often inappropriate and not properly graded. The life history of the frog, for example, may very reasonably be left for the Standards. Too often the main object of this special teaching, viz., to cultivate the powers of observation, is lost sight of, and the lessons become mere exercises for the memory.

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Never mind the Standards. In conversation with Infant teachers I sometimes learn of their intense anxiety to fit their children to do well in the upper school. To this end they not infrequently sacrifice some of the best teaching methods adapted to infants and substitute some mechanical and advanced methods from the Standards. It is a laudable aim to endeavour to push the children forward, but it appears to me that it is the Standards that want to be brought into line with the infant schools (*vide* Circular on the Lower Standard Instruction). And so I cannot praise a mistress for putting her first class through Standard I. reading books or for teaching them to spell. Something must be left for the upper school teachers to do. The infant school instruction can never benefit educationally by assimilation to the Standards.

Answers to Correspondents.

X.—(1) Your friend had better get his managers to state his case to the Department, asking whether his apprenticeship can count in the event of his passing the preliminary. My own impression is, he stands exactly as a person who has never been a P.T.

(2) I should advise you to apply to your Inspector, asking to be allowed to read and recite again. You should obtain higher marks than you did in '95 for these subjects.

(3) For the Q.S. Examination in England Freehand Drawing alone counts.

(4) I do not believe any reliable information on this point is forthcoming. For Pupil Teachers it is 75 per cent. I should say about 60 per cent. for Queen's Scholarship.

W.C.D.—My answer refers to England. I believe, however, that the same conditions hold good in Scotland. There are three grades in the Inspectorate—(1) Her Majesty's Inspectors, appointed by the Queen in Council; (2) Sub-Inspectors, Class I., appointed from Sub-Inspectors, Class II.; (3) Sub-Inspectors, Class II., appointed after nomination by the Lord President of the Committee of Council on Education. It is as a Sub-Inspector, Class II., that you would begin work. Write to Henry Craik, Esq., Secretary, Dover House, Whitehall, London, S.W.

S.M.—Write to the Registrar, University College, Cardiff, or a syllabus of the Welsh Matriculation Examination. I cannot hold out much hope to you if you have gone down in the Queen's Scholarship Examination. I don't think you would be permitted to sit for the Scotch Q.S. Examination unless you took a situation in Scotland, and even then I am doubtful. Write to the Secretary, Scotch Education Department, Whitehall.

L.W.L.—(1) Yes, they would certainly give you credit for your results in May Examination. I know of no translation to Michaud's 'Croisade.' Can any reader help *L.W.L.* in this matter?

G.F.S.—Advanced 1st (75), 2nd (60), Elementary 50. The first 102 lines of Milton's 'Lycidas,' or the quarrel scene between Brutus and Cassius from Shakespeare's 'Julius Cæsar.' For reading no author is specified. I advise you to read one of Scott's novels, say, 'The Fair Maid of Perth'; and, in addition, go through two or three leading articles of a London paper every week.

H.N.—You will be running it very close if you have only two Article 68's. You will then have staff for 120. Yes, there is nothing to prevent it.

OUR TUTORIAL SECTION

LONDON MATRICULATION.

June 1898.

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LATIN.

Course for February.

1. Vergil, 'Aeneid,' Book II., 245–450. Revise Book I., 1–400.
2. Grammar.—Prepositions and Conjunctions. The Verbs of the first and second conjugations that are irregular in the perfect and supine. In the Syntax learn the uses of the participles, supines infinitives and the subjunctive in principal sentences. Revise the declensions again.
3. 'Anglice Reddenda,' 85 to 95.
4. Sentences from Bradley's 'Arnold' or Bayfield and Allen's 'Exercise Book.'

Latin Grammar Notes.

The *supines* are really the accusative and ablative respectively of a verbal noun. The supine in *um* is only used to express purpose after a verb of motion, and is a relic of the old usage of the acc. without a preposition to express 'motion to.' The supine in *u* is used after certain adjectives.

Note the participles that an ordinary verb possesses in Latin, and the ways in which the places of the wanting participles are supplied. We have mentioned in our typical sentences the methods of translating the perfect participle in English into Latin. In turning the present participle in English into Latin, be careful to use the present participle *only* when the time of the action denoted by the participle is the same as that denoted by the verb to which it is attached.

For example, 'Caesar, hearing this, broke up the assembly' will not be translated '*Caesar hoc audiens concilium dimisit*,' but by '*Caesar hoc audito*,' etc., as the action denoted by 'hearing' is antecedent to that denoted by the verb 'broke.' Note how a 'when' clause is often neatly turned by a present participle in agreement with the direct or indirect object of a verb, *e.g.*, in a sentence given at Matriculation, 'He gave me money when I did not ask for it,' '*Mihi non roganti pecuniam dedit*,' and 'He praised Balbus when absent,' '*Balbum absentem laudavit*.' The uses of the gerund and gerundive are very important. In form the neuter of the gerundive is the same as the gerund. The gerund is, however, a verbal noun, supplying the oblique cases of the inf., is active in meaning, and governs the same case as the verb from which it comes. The gerundive is a verbal adj., is passive in meaning, and is almost equivalent to a future passive participle, *e.g. res laudanda*, 'a thing to be praised.' It is also used as a finite verb with the parts of *sum* to denote necessity agreeing with its subject. In English we prefer to use the active in translating, *e.g.*, *haec nobis facienda sunt*, 'we must do these things'; lit., 'these things are to be done by us.' This is one of the ways of translating 'must' into Latin. If the verb in Latin is an intransitive verb, *e.g.*, 'we must die,' the Latin will be *nobis est moriendum*. Grammarians hold different views on what *moriendum* is. Most hold now that it is the nom. of the gerund, and that the literal translation is 'there is a dying by us.' Others hold that *moriendum* is the gerundive used impersonally, lit., 'it must be died by us.' Take the sentence, 'She who must be obeyed.' Now to translate this by *ea quae parenda est* would be utterly wrong, because *pareo* is an intransitive verb in Latin, as it governs the dative; hence we should say *ea cui parendum est*.

In connection with the gerund, the most peculiar idiom is the use of the gerundive for the gerund when the latter could be used with an accusative case after it, *e.g.*, *spes bellum conficiendi* becomes *spes belli conficiendi* (the acc. goes into the case of the gerund and the gerundive agrees with it). In the acc. and ablative this change must always be effected. This was the point in the question asked a few years ago. 'Correct or justify *aedes ad deos colendum struxit*,' he built a temple to worship the gods.' *Colendum* should have been *colendos*, to agree with *deos*. *Aedes*, too, ought to have been *cedem*.

The use of the tenses of the infinitive in Latin affords difficulty to a beginner. The present infinitive denotes the same time as that of the verb on which it depends. *Dixit puerum sapientem esse*, 'He said the boy was wise' (at the time he was speaking). *Dixit puerum sapientem fuisse*, would mean 'He said the boy was wise previously to the time of his remark.'

The perfect infinitive is not to be used in Latin unless the action denoted by it is antecedent to that denoted by the verb on which it depends. Now students should be very careful to avoid using the present infinitive after the verbs *debeo*, *possum*, etc., since the action denoted by the infinitive cannot possibly be antecedent to the duty, possibility, etc., expressed by these verbs. Hence we must say in Latin *hoc facere debuit*, 'he ought to have done this'; *hoc facere potuit*, 'he could have done this.' Note how the future infinitives, active and passive, are formed. The future infinitive active is formed by the future participle and *esse*, or by *fore ut* and the subjunctive when the supine of the verb is wanting. The future infinitive passive is formed by *iri*, the present infinitive passive of *eo*, and the supine in *um*. The future infinitive is used in Latin if the time of the action denoted by the infinitive is future to that denoted by the verb on which it depends. Take, for example, the sentence, 'He said the kings would be killed.' Here the action of 'killing' is future to that of speaking, hence the future infinitive passive must be employed, and we write *dixit reges interfectum iri*, the literal translation of which is, 'He said there was a going to kill the kings.' Remember that *interfectum* is supine, not the perfect passive participle, and is not, of course, affected by the number of *reges* which is its object. Remember, too, the use of the future infinitive after *spero*, *minor*, *promitto*.

You must avoid using the infinitive as subject except when it is the subject of (1) an impersonal verb; (2) the verb *est* with predicate —*e.g.*, *dulce est pro patria mori*, *hoc facere me iuvat*. In the sentences we have given the rules for the use of the accusative and infinitive after verbs of *sentiendi* and *declarandi*.

The historical infinitive is an infinitive found in vivid narrative. This is the only case in Latin where the subject of the infinitive is in the nominative case. The historical infinitive is not confined to history. There are several instances of it in poetry.

The classes of verbs that take the infinitive as complement are important.

Adjectives in prose, except *paratus*, do not take the infinitive as complement. Avoid expressions like *dignus hoc facere*.

Note that the subject of an infinitive when indefinite is generally omitted, and adjectives, etc., referring to it are put in the accusative singular—*e.g.*, *sapientem esse decet*, not *sapiens esse decet*.

The adjectival complement of the infinitive is, however, in the nominative when the subject of the infinitive is not indefinite, and is not expressed, as *vult esse bonus*, 'he wishes to be good.'

Remember that verbs of fearing are followed by the infinitive in Latin when followed by the infinitive in English, as *timet mori*, 'he fears to die.' The infinitive of exclamation is important. Note *mene incepto desistere victam*, which is an instance of this in Book I. of the 'Aeneid.'

The uses of the subjunctive in principal sentences come under four main heads: (1) Dubitative or Deliberative, (2) Potential, (3) Optative, (4) Passive, Prohibitative, and Hortative.

Solution of Sentences set last Month.

(1) Carthaginem non ivisset quin fratrem suum certiorem faceret.

(2) Ecquis se nullo rogante hoc respondisse ei dixit?

(3) Cum seni parcere deberet milites eum crudelissimis suppliciis interficere ultro iussit.

(4) Hostes adesse certior factus legatis ut progrederentur imperavit.

(5) Non dubitari potest quin militibus singulis vicenos quinos tritici modios quaternis sestertiis vendiderit.

(6) Nemo eum meliorem esse quam qui viveret dixit.

(7) Alii eum Syracusas ivisse, alii Romae esse crediderunt.

(8) Ecquis mihi potest dicere quis Gallos quominus urbem incenderent et agros vastarent prohibuerit.

(9) Homerus caecus fuisse dicitur.

(10) Militibus ut ad proximas silvas se reciperent et hostium impetum expectarent est imperatum.

Typical Sentences.

19. Cæsar would not have threatened to injure these men if the soldiers had informed him of this matter.

Caesar se his nociturum nunquam esset minatus si milites de hac re eum certiorem fecissent.

Notes.—(*a*) 'Would have,' in a principal sentence, is rendered in Latin by the pluperfect subjunctive if 'would have' implies a condition that has not been carried out, and if the 'if' sentence is expressed, the verb in that sentence will be either in the pluperfect or imperfect subjunctive. Hence here we have *fecissent*, and *not fecerant*. (*b*) *minor*, as explained before, is followed by the acc. and future infinitive. (*c*) Note the phrase for 'to inform.' The adj. *certior* agrees with the object of *fecissent*, as the object here is *eum*, *certiorem* is used. (*d*) 'Of' depending on a verb where you could substitute 'about' is generally expressed by *de*, and not by the genitive, *e.g.*, 'I talk of this man' is *de hoc loquor*, not *huius loquor*.

20. If your friend were to march to-morrow from Rome to Capua he would be worn out by the journey.

Si amicus tuus Roma Capua cras contendat, itinere conficiatur.

Notes.—(*a*) *Would*, in a principal clause implying a condition, is expressed by (1) the pres.-subjunctive if the action refers to the future, (2) by the imperfect subjunctive if the action refers to the present or to the past. Here the action refers to the future (*cras* shows this clearly). Now, in the 'if' clause the *subjunctive* must be used if the verb in the principal clause is subjunctive, and the the tense of the subjunctive will be the same as that in the principal clause. Hence, in the sentence we write *conficiatur*. (*b*) For the rules for *motion to* and *motion from* in reference to names of towns, see previous rules. (*c*) *Itinere* is ablative of cause or instrument; therefore no preposition is to be used.

21. He said that his friend would not have done this if he had heard that the consuls had been defeated at Gabii.

Negavit amicum suum hoc facturum fuisse si consules Gabiis victos audivisset.

Notes.—(*a*) Here 'would have' occurs in a sentence which in Latin has to be expressed in the acc. and inf. as it depends on a verb of saying. Therefore the pluperfect subjunctive is not admissible, but the *future participle* with *fuisse* is used instead; hence, *facturum fuisse* is used above. (*b*) When we in English use a verb of saying, followed by a negative 'that clause,' we must not express this in Latin by *dico* followed by a negative infinitive clause, but use *nego* and a positive infinitive clause. The literal translation of the sentence given above is 'he denied that his friend would have done this.' (*c*) The subjunctive *audivisset* is due to the rule given in sentence 19, as *facturum* fuisse represents *fecisset* in Oratio Recta. (*d*) *Gabii*, name of a town plural in form, hence the abl. to express 'place where.' (*e*) *victos*, the perfect inf. is used, as the action of *victos* is antecedent to that of *audivisset*.

22. No one asked your brother what would have happened if the soldiers had burnt the town.

Quid eventurum fuerit, si hi milites oppidum incendissent nemo fratrem tuum rogavit.

Notes.—(*a*) In dependent interrogative and consecutive sentences, *would have*, (1) if the verb is active, is expressed by the periphrastic perfect subjunctive, (2) if the verb is passive, by the gerundive with the perfect subjunctive of sum. Hence, here we have *eventurum fuerit*. (*b*) *incendissent* is used according to the rule in sentence 19. The verb on which it depends would, if not dependent on *rogavit*, have been written *evenisset*. The change of *evenisset* to *eventurum fuerit*, necessitated by its dependence on *rogavit*, will not, of course, affect the mood and tense of *incendissent*.

Vergil II. 245—450.

248. *esset*, subjunctive is used because *quibus* is causal.

250. *oceano*, abl. of motion from, without a preposition.

265. *sepultam* is used in two different meanings, with *somno* and *vino*. This is known as *zeugma*; cf. Dickens' 'the old lady was carried off in a flood of tears and a sedan chair.'

273. The construction of this line is most important.

275. *exuvias indutus*, use of the passive participle with an acc.; imitation of the Greek middle voice.

283. *expectate*, voc. for nominative: distinguish *vĕnis* and *vēnis*.

289. *dea*, abl. of origin.

311. *proxumus ardet Ucalegon*, 'U's house is the next to burn.'

312. Note position of *Sigea frĕta*. Distinguish *frĕta* from *frēta* (adj. *fretus*, 'relying on').

322. *prendimus* = *prendamus*. The indicative is used for the deliberative subjunctive for the sake of vividness.

325. Note the use of *fuimus*, 'we were,' but are no longer.

332. *angusta viarum*, Graecism—neuter pl. of an adj. with a genitive of a noun = the noun and the adjective in agreement with it: here = *angustas vias*.

346. *audierit*, subjunctive because *qui* is causal.

350. *sit*, subjunctive of dependent question.

353. An instance of *hysteron proteron*, or 'putting the cart before the horse.' Page denies the existence of *hysteron proteron*, but cf. our English phrase 'to put on one's shoes and stockings.'

366. Distinguish *sŏli* (from sōlum) and *sōli* as here (from sōlus).

369. Note the lengthening of *o* in *favor*.

377. *delapsus*. This use of the participle after a verb of perception is a Graecism.

379. nītens (here) from nitor; nĭtens from nĭteo.

411. Note the lengthening of ūr in *obruimur*.

413. *ereptae virginis*, gen. of cause. Note the past participle in agreement with a noun where we would say 'the carrying off of the maiden'; cf. Milton, 'since created man' = 'since the creation of man.'

433. *vices Danaum*, the answering blows of the Greeks' (Page), or 'hazard of encounter with the Greeks.'

Lines 430-452 are very important.

FRENCH.

Course for February.

1. A certain amount of translation, and a certain number of exercises from English into French each week.

2. In the Grammar learn the irregular verbs of the 2nd, 3rd and 4th conjugations. For the Matriculation the irregular conjugations are more important than anything else, and students should constantly refer to them till they are known perfectly.

ENGLISH.

Course for February.

Grammar.—The relation of English to other languages, especially to the Indo-European languages. Ths sources of the English vocabulary. The historical characteristics of the English language.

History.—From the death of Edward IV. to the death of Elizabeth. Revise the early period up to the Norman Conquest.

English Notes.

Grammar.—The meaning of the term Indo-European or Aryan languages is important. Learn the groups of languages comprised therein, and the subdivisions of these groups, especially the subdivisions of the Teutonic group.

Note the languages which are most closely allied to English. Learn the proof of the statement that English is a Teutonic and not a Romance language. Note the various sources of the English vocabulary, and the causes which have introduced so many non-Teutonic words into English. Note especially the influence of Latin, Greek, French, Spanish, Italian, Dutch, German, Celtic, and Scandinavian on English. Note the four periods at which English was affected by the Romance languages in vocabulary and pronunciation. Learn lists of words showing the borrowings which English has enjoyed from other languages. Learn a small list of non-Indo-European words found in English. Note what is meant by the terms *synthetic* and *analytic* as applied to *language*. The development of English should be known. Learn to distinguish the Teutonic and Romance elements in English. It is important to know the characteristics of each. Note how new ideas are expressed.

History.—Note especially the respective claims of Henry VII., Lady Jane Gray, and Arabella Stewart to the English crown. Learn lives of the following:—Simnel, Warbeck, Cromwell, Wolsey, Sir Thomas More, Cranmer, Latimer, Ridley, Raleigh, Burleigh, Drake, Bacon, Sir Philip Sidney. Note the insurrections in Henry VII.'s reign; the institution of the Star Chamber and the Court of High Commission; the Poor Laws; the Statutes against Livery and Maintenance; the Statute of the Six Articles; the Act of Annates; the Acts of Supremacy; the Pilgrimage of Grace; Kett's Rebeilion; the Dissolution of the Monasteries; the Field of the Cloth of Gold; the Babington Plot; the Ridolfi Plot; the Spanish Armada; Colonisation

in Elizabeth's time; the life and career of Mary Queen of Scots; affairs in Ireland; wars with Scotland; Cromwell and Wolsey's policy; the progress of the Reformation in England in the reigns of Henry VIII. and Edward VI.; foreign policy during these reigns.

MATHEMATICS.

GEOMETRY COURSE.

Book III. should be continued to the end of Prop. XX., at the same time revising the first ten of the same book.

Solutions to the riders of our previous course :—

(1) Using the figure for I. 47, as given in Hall and Stevens, the following will be the proof ;—

Let AL and BC meet at R.

As in I. 47 sq. on AB = figure BL.

∴ sqq. on AB . BC = figures BL . BE
= CL and twice BL
= sq. on AC and 2 rect. CB.BR,
since as in I. 47 sq. on AC
= figure CL.

(2) Rect. AC . BD = AC . BC + AC . CD by II.
= AC.BC + CD . BC + AB.CD, by the same,
= AD . BC + AB . CD.

(3) Let ABCD be a trapezium, of which AB is parallel to DC. Bisect AD in P and BC in Q, join SQ, and through Q draw RQS parallel to AD, and meeting AB . DC produced if necessary in R and S respectively.

Then by I. 26, triangles SQC . BQR are equal in all respects.

$$\begin{aligned} \therefore SC &= BR ; \\ \therefore CD &= DS + SC \\ &= DS + BR; \\ \therefore CD + AB &= DS + BR + AB \\ &= DS + AR \\ &= 2AR \\ &= 2PQ. \end{aligned}$$

Note figures ARQP . PQSD . ARSD are all parallelograms.

Problems for February.

(1) Draw a tangent to a circle parallel to a given straight line.

(2) If a quadrilateral be described about a circle, the sum of one pair of opposite sides is the equal to that of the other pair.

(3) Find a point from which the tangent drawn to a given circle is of given length.

ARITHMETIC COURSE.

Chapter XXXII. of Pendlebury may be read, and plenty of the examples worked.

Note the following :—

(*a*) £8,300 stock means 83 shares of a stock originally of value £100 each.

(*b*) Brokerage $\frac{1}{2}$ per cent. increases the price of a share of £100 to a buyer by 2s. 6d., and lessens the money a seller gets for his stock by 2s. 6d. a share.

Examples :

(1) A person invests £1,150 in 4 per cent. stock at £114$\frac{7}{8}$; what is his income (brokerage = $\frac{1}{4}$ per cent.) ?

Here price of a share = £115 ($114\frac{7}{8} + \frac{1}{8}$).

∴ number of shares bought = $\frac{1150}{115} = 10$.

∴ income = $\frac{1150}{115} \times 4$, since the stock pays an annual dividend of £4, = £40.

(2) If he sell the same at £114$\frac{7}{8}$ what will he get ?

Since the broker charges £$\frac{1}{8}$ to sell a share,

∴ for 1 share he gets £114$\frac{3}{4}$.

∴ for 10 shares he gets £1,147$\frac{1}{2}$.

Solution to example set last month:

Here if an article be marked £100, it cost £56, and being sold at a discount of 12$\frac{1}{2}$ per cent. it would be sold for £87$\frac{1}{2}$, so that an article costing £56 is sold for £87$\frac{1}{2}$.

$$\therefore \text{one costing £100 } ,, \quad ,, \frac{£87\frac{1}{2} \times 100}{56} = £156\tfrac{1}{4},$$

showing that the gain per cent. is £56$\frac{1}{4}$.

Problems for next month :—

(1) Which is the better investment, the 6 per cent. stock at £110 or 5 per cent. at £109 (no brokerage) ?

(2) What is the income produced by investment of £1,500 in 3 per cents. at £97$\frac{7}{8}$ (usual brokerage) ?

ALGEBRA COURSE.

Chapter XXV. of Hall and Knight may form this month's reading, together with the working of every third example in each set in that chapter, and the working of the first dozen problems in the previous chapter.

Solutions to last month's questions :—

(1) $$\begin{aligned} &(x^2 + y^2 + z^2 - xy - xz - yz)^2 - (x - y)^2 (y - z)^2 \\ &= (x^2 + y^2 + z^2 - xy - xz - yz)^2 - (xy - xz - y^2 + yz)^2 \\ &= (x^2 + z^2 - 2xz)(x^2 + 2y^2 + z^2 - 2xy - 2yz) \\ &= (x - z)^2 [(x - y)^2 + (y - z)^2] \\ &= (x - z)^2 (x - y)^2 + (x - z)^2 (y - z)^2. \end{aligned}$$

(2) Let $3x$ and $4x$ be the sides,

Then diagonal = $\sqrt{9x^2 + 16x^2} = 5x$,

$$\begin{aligned} \therefore 5x &= 125, \\ \therefore x &= 25, \\ \therefore \text{area} &= 12x^2 \\ &= 7500 \text{ sq. ft.} \end{aligned}$$

(3) $$\begin{aligned} \frac{1}{\sqrt{3}} &= \frac{\sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{3}}{3} \\ &= \frac{1{\cdot}732\ldots}{3} \\ &= {\cdot}577\ldots \end{aligned}$$

$$\begin{aligned} \frac{1}{\sqrt{3} - \sqrt{2}} &= \frac{\sqrt{3} + \sqrt{2}}{(\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})} \\ &= \frac{1{\cdot}732\ldots + 1{\cdot}414\ldots}{(\sqrt{3})^2 - (\sqrt{2})^2} \\ &= {\cdot}318, \text{ since } (\sqrt{3})^2 - (\sqrt{2})^2 = 3 - 2 = 1. \end{aligned}$$

We append a few questions :—

(1) Simplify $\dfrac{x^6 + x^5 - x^4 - x}{x^6 - 1}$.

(2) Solve the equations

$$\begin{aligned} x + y &= 4 ; \\ (a + b)x + (a - b)y &= 4a. \end{aligned}$$

(3) A gravel path 2 yards wide is made round a square field, and it is found that it takes up one-twentieth of the area of the field. Prove that the area of the field is nearly 25,000 square yards.

(4) The length and breadth of a room are as 3 : 2, and if 3 ft. be added to each the new area of the floor is to the old area as 35 : 27. Find the dimensions of the room.

MECHANICS COURSE.

Loney's Chapter III. should be read, and *all* the examples worked; and in the Hydrostatics, Chapter XIX. should be read, and as many as possible of the examples should be worked.

The dynamical portion of the subject should be kept up by the working of miscellaneous examples. A suitable set are to be found in 'Notes and Examples on Mechanics,' a small pamphlet written by myself, from whom it may be obtained (post free 1s. 6d.).

Note that if a set of forces are in equilibrium, the algebraic sum of their resolved parts in any direction is zero.

Article 38 is important. Some of Examples IV. should be worked by the method described therein.

Illustrative Examples :

(1) What is the pressure on an area of 1 sq. yd. at depth of 10 feet in water, the height of the mercury barometer being 30 inches, and the sp. gr. of mercury 13 5.

Here the height of water barometer = $30 \times 13\frac{1}{3}$ inches
= $33\frac{1}{4}$ feet,

so that we have an area of 9 sq. ft. at a uniform depth of $43\frac{1}{4}$ feet (= $10 + 33\frac{1}{4}$),

$$\begin{aligned} \therefore \text{pressure} &= 43\tfrac{1}{4} \times 9 \times 1000 \text{ oz.} \\ &= 393750 \text{ oz.} \end{aligned}$$

(2) A force of 10 lbs. acts towards the North; find its resolved parts (*a*) in a N.E., (*b*) in a N.W., and (*c*) in a S.E. direction.

(*a*) The angle between N. and N.E. being 45°, resolved part = $10 \cos 45$

$$\begin{aligned} &= \frac{10}{\sqrt{2}} \\ &= 5\sqrt{2} \text{ lbs.} \end{aligned}$$

(*b*) The angle between N. and N.W. being also 45°, the working and answer are the same as in (*a*).

(*c*) The angle between N. and S.E. being 135°, resolved

$$\text{part} = 10 \cos 135 = -10 \cos 45 = -5\sqrt{2}.$$

We add a few questions:

(1) 5 c.c. of a liquid, s. = ·7, is mixed with 2 c.c. of water; find the s.g. of the mixture.

(2) A cube of volume 216 cub. ft. hangs in water with its upper face horizontal and at a depth of $1\frac{1}{2}$ feet Neglecting the air pressure, find the pressure on one of its vertical faces.

Hints on last month's test paper:

(2) Using the figure of II. 5. as given in Hall and Stevens, Euclid proves that

$$PB^2 \text{ is larger than rect. } AQ \cdot QB$$

Let now $AQ = a$, and $QB = b$

we then have $\left(\frac{a+b}{2}\right)^2$ larger than ab,

$$\therefore \frac{a+b}{2} \text{ larger than } \sqrt{ab}.$$

(3) Answer is $a^2 + b^2 + 1 - ab + a + b$.

(4) It is evident from the question that £150 amounts in 2 years to £160$\frac{1}{8}$ at the given rate.

Let the per cent. be such that £1 in 1 year amounts to R £ we get the equation

$$150\ R^2 = 160\tfrac{1}{8},$$

leading to $R = \frac{161}{150}$, and hence the per cent. is $3\frac{1}{50}$.

(5) The important points in the enunciation of the triangle of forces are the words 'acting at a point' and 'taken in order.'

Mathematical test paper:—

1. State the algebraic equivalents of Euclid II. 4, 6, and 7.
2. Find as far as 2 decimal places the square of ·3456789.
3. Is the converse of the polygon of forces true? if not why not?
4. What is meant by an inelastic body?
5. How is pressure at a point defined and measured?

CHEMISTRY COURSE.

Carbon and its oxides may be studied this month, as also the hydrocarbons CH_4 and C_2H_4.

Note that CO_2 may be absorbed by caustic potash KHO.

It is useful to remember that gas may be dried—

(1) by passing over pumice stone moistened with strong H_2SO_4.

(2) by passing over fused calcium chloride ore.

(3) by phosphoric pentoxide.

Note also that

11·2 litres of H weigh 1 gramme,
and 1 litre of H weighs ·089 gramme.

To find the weight of 1 litre of N, since the atomic weight of N is 14,

1 litre of N weighs 14 times 1 litre of H,
or 14 × ·089 grammes.

1 litre of steam weighs 9 times 1 litre of H, or ·801 grammes, since the molecular weight of steam is 18, whilst that of H is 2, showing the density of steam referred to H to be $\frac{18}{2}$ or 9.

10 grammes of H are burnt in O to find the weight and volume of steam produced.

The equation of $H_2 + O = H_2O$ shows us that

2 grms. H produce 18 grms. of steam,
and ∴ 10 ,, ,, 90 ,, ,,

Now 1 grm. of H occupies 11·2 litres,

∴ 1 ,, steam ,, $\frac{11{\cdot}2}{9}$ litres,

∴ 90 ,, ,, ,, $\frac{90 \times 11{\cdot}2}{9}$ litres

$= 112$ litres.

Note that densities of compound gases are half their molecular weights, *e.g.* HN_3 density = $\frac{43}{2}$, N_2O density = 22, whereas for simple gases, *e.g.*, O, H, &c., the atomic weights and densities are the same.

*** **Students of the Matriculation Course are invited to write for assistance in cases of doubt or difficulty. Communications should be marked 'Matriculation,' care of Editor P.T.**

OUR L.L.A. COURSE.

HONOURS EDUCATION.

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QUICK'S 'EDUCATIONAL REFORMERS,' CHAPS. I.—X.

I.—*Digest.*

Chap. I. We must study the past as the only means to guidance in the future. Hence the history of education will forewarn, and therefore forearm, the teacher against pitfalls.

The Renascence. This is rightly taken by Quick as an all-important educational starting point. The fall of Constantinople in 1453 caused the Greek scholars who had found the city the centre of attraction to migrate westward. They speedily induced the scholars of the West to take great interest in Greek and Latin works, and this **not because of the wisdom contained therein,** but **solely on account of the style** in which they were written. This naturally led to verbalism, *i.e.* to the regard of knowledge as consisting in words and not so much in things, and by consequence to the glorification of the verbal memory. **Realism or the study of things** first, and words only so far as subserving a knowledge of things, was an unknown faith. The bad effect of this upon the school was most deplorable. 'The inevitable consequence was this: education became a mere synonym for instruction in Latin and Greek. The only ideal set up for the "educated" was the classical scholar.' The evil of this was fivefold.

1. **The learner was exalted above the doer,** whereas education should react upon men's actions. This is recognised nowadays when the school is regarded as the natural supplanter of the gaol.

2. **It magnified the direct formative power of literature** which is, after all, a very small force in the lives of most men, who (*a*) read very little, and (*b*) read what is not literature, *i.e.*, works conspicuous for the expression of beautiful ideas in words that are no less beautiful.

3. **It banished literature from the schools.** It is felt by those who have to teach Latin and Greek that in most cases either the student never gets sufficiently well advanced to understand the language well enough to appreciate the beauties of style or of meaning, or that he is so disgusted with the drudgery involved in the learning, as to associate the very name of Latin and Greek with tedium and tiresomeness. Hence it follows that 'literature for the young must have its expression in the vernacular. But the classicists took no account of the native language, some of them actually prohibiting its use altogether, so that in the history of education we have to regard the teaching of the vernacular as a novelty equally startling as the inculcation of knowledge by the observation of things instead of from books. It is a very grave indictment of the Renascence ideal to say, as is but true, that it tended to belittle the teaching of the native tongue, a knowledge of which is by far the best stepping-stone to a knowledge of a foreign language. Kinglake, whose enjoyment of the 'Iliad' was marred by his drilling in Greek, is a very pregnant and awful warning to those who think that the royal road to appreciation of literary excellence lies by the way of a compulsory study of Greek or Latin.

4. **There was no compensation for failure.** Shakespeare's 'little Latin and less Greek' did not make for literature in his case, nor does it with anybody. If the student of the classics does not get his reward in the shape of a pleasurable appreciation of the beauties of style in the authors that he reads, there is no compensation for him in the matter; for whatever of wisdom is contained in the writings of the ancients, has most certainly found expression in the works of the moderns, and, but too frequently, the matter read in the classic author is uninteresting and incapable of useful reaction upon the conduct of the reader.

5. **It set no value upon the education of little children,** whereby it most showed its unwisdom, for undoubtedly education, considered as development, begins with the cradle just as it ends with the grave. This is emphasised, as it should be, in the doctrine of the modern educationist.

Chap. II. 1. **The Scholars,** headed by Erasmus, who studied things only so far as was necessary to make them understand the books they read. There was no study of things in order to understand them. They were charmed with the form and endeavoured to understand the substance only because of its connection with the form.

2. **The Verbal Realists,** who set no value on style, but valued highly the substance. Yet they were content to get their knowledge of things **from books** and not from things. Rabelais forms a connecting link between these verbal realists and the realists proper.

3. **The Stylists,** to whom substance was nothing and form or style everything. To this class a knowledge of things was undesired. '**In studying literature the Scholars cared for both form and substance, the Verbal Realists for substance only, and the Stylists for form only.**' In one repect they were all agreed. The world was to be regenerated by means of books. Nothing pleased them more than to think of their age as the Revival of Learning.

Chap. III. Sturm (1507-1589). Brilliant administration coupled with wrong conception are the chief characteristics of Sturm's forty years at the head of the Strassburg Gymnasium, and as Universal Adviser on school establishment all over the world. Of the theoretical trinity of aim, viz., (1) **piety or wisdom,** (2) **knowledge,** and (3) **the art of expression,** the two former were lost sight of, and the true aim resolved itself in practice into the third. Hence pure unadulterated **verbalism,** the effect of which is well described in the passage quoted from Butler, which deserves to be learnt by heart :—'*Thus the schoolmasters, with Sturm at their head, set themselves to teach* **words**—*foreign words, and allowed their pupils to study nothing else, not even the mother tongue . . .* Latin, indeed, was to supplant the mother tongue, and **boys were to be severely punished for using their own language.**'

Chap. IV. The Jesuits (1540 to present day). Their 'code,' the **Ratio Studiorum** Principle (or Method of Teaching and Learning), was outlined in 1584 by Aquaviva's Commission, and assumed permanent form in 1599, remaining unmodified until 1832. Teachers were trained at the Juvenats. They gave themselves up entirely to teaching, and 'went up' with their classes. All had to adopt the established methods to secure uniformity in practice and policy. Each officer had to report on those below him to his superior. The various officers were (1) **General,** or head of the whole system ; (2) **Provincial,** controlling a district ; (3) **Rector,** or head of a college appointed by the General ; (4) **Prefect of Studies** appointed by the Provincial ; (5) **Class Teachers;** (6) **House Prefect;** (7) **Monitors.** The buildings were provided and maintained by gifts, the education being also gratuitous. There were two courses of study : (1) **Studia inferiora** (lower schools), from 10 to 16 ; (2) **Studia superiora** (higher schools), to commence before attaining the age of 24 years.

Lower Schools. Two classes of pupils were admitted, viz., **Nostri** and **Externs.** The school was divided into five classes, viz., Lowest, Middle, and Highest Grammar classes, and classes for the Humanities and Rhetoric, a year being taken for each class except the last, which required two years. The curriculum included **Grammar,** and whatever relates to **Rhetoric, Poetry,** and **History.** The mother tongue could not be written or spoken without special permission from the Provincial, Latin being the only language used. The instruction was mainly oral, and 'the pupils were required to get up the substance of these lectures, and to **learn the grammar-rules and parts of the classical authors by heart.** The master had to carefully prepare his lessons. The Decurions, after repeating their tasks to the masters, heard the boys repeat theirs, the masters in the meantime being engaged in marking the written exercise. Each boy had an **æmulus,** or rival, whose duty it was to catch him tripping. **Emulation was carried to pernicious excess.** Æmuli, Rome and Carthage Academies attest this. Prizes, titles, badges, etc., appealed to self-love. School hours were short.

The main aim was to teach Latin ; History, Geography, and General Information subsidiary to this.

Order of Lecture.—(1) **General meaning** of the whole passage ; (2) **Explanation of each clause** both as to sense and as to construction ; (3) **History, geography, etc.,** arising out of the passage ; (4) **Rules of rhetoric and poetry bearing upon the passage ;** (5) **Examination of the Latinity,** *i.e.*, the style and quality ; (6) **Connected Moral Lesson.**

REPETITIO MATER STUDIORUM (Repetition is the mother of studies). This famous saying of the Jesuits shows how much they believed in the cultivation of the mere verbal memory. Two repetitions were connected with each lesson, one day per week was devoted to repetition entirely. The second half of each year was spent in going over the work of the first half, in the case of the lower forms No wonder that elaborate schemes of emulation, rewards, and punishments were needed to keep up the attention under such deadening conditions.

Examinations were held yearly, and were carefully prepared for. They were partly verbal and partly written.

The master was exhorted to a high ideal of his calling, to the end that **moral training** might be excellent. Prayers, daily mass, and frequent confessions were enjoined.

Health was highly regarded, and excursions, coupled with physical exercise and other forms of recreation, were made use of to keep the body in good condition and to give the mind a healthy rest. Punishment was to be light, and in case of grave delinquency was to be given by a 'corrector,' not by the master.

GOOD POINTS.—(1) **Intensely practical.** 'The method; such as it was, was applied with undeviating exactness.'

(2) **Masters lead** by sympathy and by interest. 'Let him unite the grave kindness and authority of a father with a mother's tenderness.'

(3) **Overpressure was avoided** by basing the task upon the known capacity of the scholar, both length and difficulty being considered.

BAD POINTS.—(1) **Their conception of education was a very defective** one. 'Originality and independence of mind, love of truth for its own sake, the power of reflecting and of forming correct judgments were not merely neglected—they were suppressed in the Jesuits' "system."' Moreover, they vastly overestimated the value of memory work.

(2) **They discouraged the use of the vernacular,** being verbalists pure and simple.

(3) **They were not disinterested**—education was merely a means to their absorbing aim of bringing the people under the banner of Jesuitism.

(4) **Emulation, espionage,** and **insincerity** were serious blemishes upon their moral training.

Chap. IV. Rabelais (1483-1553).—As already said, he was a **Verbal Realist,** who set store upon a knowledge of things mainly, although sometimes this does not appear as a means to the proper understanding of books. The TRIVIUM—*i.e.*, **Grammar, Logic,** and **Rhetoric**—are not mentioned by Pantagruel, who would have Gargantua excel in the QUADRIVIUM—*i.e.*, **Arithmetic, Geometry, Astronomy,** and **Music.** In addition, we have the examination of objects even at the dinner table, the collection of specimens, and the examination of the face of the sky, all pointing to realism, the only element of disagreement being the introduction of the book, *e.g.*, Virgil's 'Agriculture,' or Hesiod's 'Husbandry,' as the guide to the study of Nature, thereby indicating the intention to study Nature not for itself, but only so far as was necessary to a proper understanding of the text ; but the many indications of a belief in Nature studies for themselves alone almost justify us in ignoring these points : still, it will perhaps be wisest to regard Rabelais as a **Verbal Realist.**

The encouragement of **physical exercises** and the **study of the will,** which was to be acted upon only by reason and by attention begotton of interest. All this is apparent from Pantagruel's letter, which should be most carefully studied.

Chap. VI. Montaigne (a Realist).—Virtue, wisdom, and **intellectual activity** are to be thought of before learning. Education to be, first and foremost, the **development and exercise of the faculties.** A **good** man is better than a **learned** man.

Training the memory is not education. '**We may become learned from the learning of others, wise we can never be except by our own wisdom.**' *Sçavoir par cœur n'est pas sçavoir.* Read the footnote to this on page 74, and also the excuse for learning as employment.

'Montaigne's system **was a revolt against** the bookishness of the Renascence. 'In our studies,' he says, 'whatever presents itself is book enough—a roguish trick of a page, a blunder of a servant, a pest at table are so many new subjects.' Compare with this the claim of the public school to teach **the art of living** by games and outdoor life, and also the change of latter days due to the greater importance attached to knowledge and the pernicious effect of examinations, which, after all, do but train the **carrying memory.** Compare Locke in that he '**thought of learning last and least,**' as shown in his Quadrivium, **virtue, wisdom, good manners, learning** (V.W.M.L.). Note also the need for another Montaigne to preach that '*a man's intellectual life does not consist in the number of things he remembers, and that his true life is not his intellectual life only, but embraces his power of will and action and his love of what is noble and right.*' Note the worship of scholarships and rewards, which do but guarantee learning ; and side by side with this put Lord Armstrong's wise words, '**The true source of power is the originative action of the mind which we see exhibited in the daily incidents of life, as well as in matters of great importance**'; and again, '**men of capacity and possessing qualities for useful action are at a premium all over the world, while men of mere education are at a deplorable discount.**'

Chap. VII. Ascham.—The recommendations of Lily, Colet, Erasmus, and Wolsey as to a more rational procedure in language teaching culminated in the doctrine of Locke, that grammar should be relegated as second to language, from which alone it should be learnt. It is as a rational teacher of language that Ascham is put forward as a reformer. He is a Methodist, and therefore the master's master. Note the coupling of Ascham, Locke, and Spencer. Here is Ascham's passport to the Reformer's corner : 'I

do wish that all rules for young scholars were shorter than they be. For without doubt **grammatica itself is sooner and surer learnt by examples of good authors than by the naked rules of grammarians.'** It is Ascham's special method of teaching Latin that has again and again been asked for, and that is likely to be asked for; therefore it must receive the student's close attention.

Ascham's Method of Teaching Latin.—(1) Enough grammar must be learnt to make it possible for the child to understand the build of a sentence—*i.e.*, **the eight parts of speech, the agreement of substantives with adjectives, of nouns with verbs, of relative with antecedent,** *i.e.* the Concords.

(2) Next set him to **work on Latin authors,** taking care to make it easily possible for him to understand them. This is done thus: 'First, let him teach the child, cheerfully and plainly, the cause and matter of the letter (the author chosen being one of Cicero's letters); then let him construe it into English as oft as the child may easily carry away the understanding of it; lastly, parse it over perfectly.'

(3) Having now understood both the sense and the form of the author, the child is now **asked to give his version of the meaning, and to show his understanding of the form** by parsing the words.

(4) Next comes **translation into English** without any help, to be followed

(5) By **re-translation into Latin,** and a comparison of this with the original text. In this way the student will learn the rules from the language, and will thereby more thoroughly grasp their meaning and be able to apply them, and, certainly, not until the rule can be applied is it of any use, and just as certainly it is only in its application that the rule is of any use.

When some progress has been made the niceties of style are to be learnt in the same way, viz., from an examination of the text. In this way the **simple** and **direct use** of a noun will be distinguished from a metaphorical use, as in the examples where 'The king was magnificently buried' contrasts with respect to the usage of the word '**buried**' when speaking of the burying of the safety and glory of the state in the sentence given, viz., 'With that chief both the safety and the glory of the state were buried.' Synonyms were distinguished, as in 'ensis' and 'gladius,' both being words for 'sword,' and 'diversa,' *i.e.* words resembling each other in the main, but differing in detail, such as delight from esteem and amuse from love. Next, words and phrases contrary in meaning, such as 'war is grievous and bitter, peace is sweet and delightful,' and so on to *dare verba*, to cheat. Finally, this stage is followed by further translations of English renderings of Latin authors back into the original Latin, with which afterwards they are to be compared. It will thus be seen that Ascham's method consisted in **imitation by double translation,** repeated again and again after a complete understanding of both substance and form. **Rapid Impressionists** do much, and that not completely. **Complete Retainers** do a little, and that thoroughly. In the first stage of this course Ascham was a Complete Retainer.

Mulcaster (1531–1611). The advocate of (1) **Realism,** (2) the **Vernacular,** (3) **Physical Training.** He may be called the Apostle of the New Education, which Quick so aptly describes:—

> (*a*) **Sense Training.** 'The hand, the ear, the eye be the greatest instruments whereby the receiving and delivery of our learning is chiefly executed, and doth not this Elementarie (Mulcaster's book) instruct the hand to write, to draw, to play? Hence—
>
> (*b*) 'The first ground-work would be laid by the best workman.' Here Mulcaster anticipates Pestalozzi and Froebel, and forecasts the modern well-trained infants' mistress.
>
> (*c*) The vernacular first and foremost. See p. 534.
>
> (*d*) **Curriculum.** English reading, English writing, drawing, singing, playing a musical instrument. This was the elementary course up to 12 years of age.
>
> (*e*) Young maidens to be admitted to learn.
>
> (*f*) **Teachers to be trained.** 'Why should not teachers be well provided for, to continue their whole life in school, as divines, lawyers, physicians do in their several professions? . . . . I conclude, therefore, that this trade requires a particular college for these four causes:—(1) First, for the subject being the means to make or mar the whole joy of our State. (2) Secondly, for the number, whether of them that are to learn or of them that are to teach. (3) Thirdly, for the necessity of the profession, which may not be spared. (4) Fourthly, for the matter of their study, which is comparable to the greatest professions, for language, for judgment, for skill how to train, for variety in all points of learning, wherein the framing of the mind, and the exercising of the body, craveth exquisite consideration, besides the staidness of the person.'
>
> (*g*) **Physical Education.** 'Is the body made by nature nimble to run, to ride, to swim, to fence, to do anything else which beareth praise in that kind for either profit or pleasure? And doth not the Elementarie help them all forward by precept and train?'

Chap. IX. Ratichius (1571–1635). The demands and the methods of the Innovators as set out on p. 104 should be carefully learned. Ratke's work was doomed to failure: not so his doctrines, of which we give a summary:—

1. **Follow Nature.** Which means, as Quick points out, study the laws of mind, for only by working in accordance therewith can the best progress in mind-development be made.
2. **One thing at a time.** This makes for thoroughness; but it also spells monotony, the deadening effect of which need hardly be stated.
3. **The same thing should be repeated again and again.** Compare the Jesuits' *Repetitio mater studiorum.* This is all right if the repetition be so varied as to avoid causing weariness; hence, '**The art of the master is shown in disguising repetition and bringing known things into new connections, so that they may, partially at least, retain their freshness.**'
4. **The mother tongue first and foremost.** This was one of the chief accomplishments of Ratke, to establish the rule that the vernacular receive first attention.
5. **Everything without restraint.** This is the 'pleasurable acquisition' of Spencer and Locke, and Quick's contention that 'You can no more hurry thought with the cane than you can hurry a snail with a pin' is one strong argument therefor, whilst the fact that we are interested in what concerns and pleases those whom we love supplies a further argument.
6. **Nothing by heart.**
7. **Uniformity** in all things.
8. **First the thing,** and then whatever explains it.
9. **Everything by experience and examination of the parts.** Here we see Bacon's influence; and Spencer, in inveighing against the dogmatic, voiced the same truth. Note the comparison of Ratke with Ascham as a language teacher.

II.—*Notes and Criticism.*

1. **The Renascence Ideal of Education.** It will be noticed that the Stylist gives way to the Verbal Realist, who in turn develops into the Realist pure and simple, so far, indeed, as concerns the theory of education; but whilst 'the theory of education' is already put boldly forward, and is in advance of its age, the practice is still dragging itself painfully along on the broken road, notwithstanding some successful attempts at improvement.'

2. **Sturm.** Quick appears to underrate Sturm, who, notwithstanding his errors, was at least on a par with the Jesuits. Compayré speaks of 'the college at Strassburg, so brilliantly administered by the celebrated Sturm,' and, although he was wrong in his aim, we cannot but admire his great zeal as well as his great learning.

3. **The Jesuits.** Quick has done full justice to all that is good in the Jesuit schools. Indeed, he has perhaps erred in over-estimation of these good points, and failed to fully set forth the defects, of which there were many. Compayré, as a Frenchman, was well informed, and, if prejudiced, we cannot reject his statements when he gives, as is generally the case, chapter and verse. 'For the Jesuits, education is reduced to a superficial culture of the brilliant faculties of the intelligence; while the Jansenists (the Port Royalists of whom we shall speak next month) aspire to develop the solid faculties, the judgment and the reason.' 'The fathers taught me nothing but Latin and nonsense' (Voltaire). 'In the matter of education the Jesuits have remained below mediocrity' (Leibnitz). 'As to whatever relates to the instruction of the young, we must consult the schools of the Jesuits, for there can be nothing that is better done' (Bacon). 'A permanent and characteristic feature of the educational policy of the Jesuits is, that, during the whole course of their history, they have **deliberately neglected and disdained primary instruction.** The earth is covered with their Latin colleges; and wherever they have been able they have put their hands on the institutions for university education; but **in no instance have they founded a primary school.**' Again we read in the **Constitutions:** 'None of those who are employed in domestic service on account of the society ought to learn to read and write, or, if they already know these arts, to learn more of them.' The basis of their moral education is, 'Blind obedience,' the suppression of all liberty and spontaneity. 'If God should appoint for our master an animal deprived of reason, you should not hesitate to render it obedience, as to a master and a guide, for this sole reason, that God has ordered it thus.'

'As to instruction,' says Bersot, 'this is what we find with them: history reduced to facts and fables, without the lesson derived from them bearing on the knowledge of the world; even the facts sup-

pressed or altered when they say too much . . . . physical science reduced to recreations, without the spirit of research and liberty; literature reduced to the complaisant explication of the ancient authors, and ending in innocent witticisms. . . . With respect to letters, there are two lives that have nothing in common save the name; one of them makes men, the other great boys. It is the last that we find with the Jesuits.'

4. **Rabelais** was born at Chinon, Touraine, 1483, and died at Paris, 1553. He reminds us of Dean Swift, since he was a master of satire and of satirical humour. His *chef d'œuvre* was the satirical romance of 'Pantagruel and Gargantua.' He became successively a monk, a doctor, and the curé of Meudon, which latter appointment he resigned, probably because of the attacks made upon the church in certain chapters of his book, which is full of wit, humour, and coarseness. Its interest to the teacher consists in the fact that Rabelais lampooned unmercifully the accepted education, and showed how a gentleman should be educated in narrating the education of the giant Gargantua by Ponocrates.

The great objection to Rabelais is the immense amount of work required of Gargantua, and the all-embracing nature of his curriculum. Concerning this Payne writes: 'This pansophic scheme of Rabelais has been revived in later times by Bentham in his "Christomathia," and, still later, by Spencer in his "Education." It seems to have been forgotten that the division of labour affects education in much the same way as it affects all other departments of human activity; that there is no more need of having as a personal possession all the knowledge we need for guidance, than for owning all the agencies we need for locomotion and communication.'

6. **Ascham.**—It is only as an improver upon old methods of Latin learning that Ascham is important. For general pedagogy we seek in vain in his work.

7. **Mulcaster.**—There is a good article on Mulcaster in the 'Cyclopædia of Education,' some parts of which we reproduce as likely to sssist the student to understand and to remember what is set out by Quick. 'In the former (the "Positions") he sketches a really excellent all-round education for body and mind, and anticipates many of the newest ideas of our day.' The 'natural abilities of children, whereby they become either fit or unfit for this or that kind of life,' are to be considered. He lays great stress—for the first time in England—on the mother tongue, and on the ability to read, write, and spell it in advance of, and, if necessary, to the exclusion of the Latin. 'As cousen germain to faire writing is the ability to draw with pen and pencil,' and this should be taught 'while the finger is flexible'—another anticipation of the views of our day. 'It is good,' he stoutly asserts, 'to have every part of the body and every power of the soul fined (or polished) to the best.' He would have every child taught music by voice and instrument, as he taught them at his own school. The younger the boy the more skilled his master should be: 'The first ground should be laid by the cunningest workman.' He insists that 'young maidens are to be set to learning, which is proved by the custom of our country, by our duty towards them, by their natural ability, and by the worthy effects of such as have been well trained.' The book is dedicated to Queen Elizabeth, and ends with a vigorous plea for the training of all schoolmasters. The 'Elementarie' is most notable for its splendidly eloquent plea in behalf of the study and use of English. 'Is it not a marvellous bondage to become servants to use tongue for learning's sake, the most part of our time, with loss of most time; whereas we may have the very same treasure in our tongue with gain of most time? Our own bearing the joyful title of our liberty and freedom, and the Latin tongue remembering us of our thraldom and bondage? I love Rome, but London better; I favour Italy, but England more; I honour the Latin, but I worship the English. . . . But why not all our learning in English, a tongue in itself both deep in conceit and frank in delivery? I do not think that any language, be it whatsoever, is better able to utter all arguments, either with more pith or greater plainness than our English tongue is.'

It is probable that Mulcaster was a friend of Shakespeare, who indeed took him as the model for Holofernes, the pedant schoolmaster of 'Love's Labour Lost.' He was the master and friend of Edmund Spenser, so that there is good reason why the man should be remembered, notwithstanding his inexcusable bombast.

8. **Ratke.**—In Ratke is admirably illustrated the fact that the theory of the Renascence reformers was miles ahead of their practice. The insight and originality of Ratke were conspicuous, and, if he failed as a schoolmaster, it is to be remembered that he attempted an impossible task both as to the number of scholars and as to the amount of knowledge he attempted to give. Compayré speaks of him thus: 'With something of the charlatan and the demagogue, Ratich devoted his life to propagating a novel art of teaching, which he called *didactics*, and to which he attributed marvels. He pretended, by his method of language, to teach Hebrew, Greek, and Latin in six months. But, nevertheless, out of many strange performances and lofty promises, there issue some thoughts of practical value.'

III.—*Questions.*

1. What were the effects of the Renascence on education in Europe? (1892, '93, '94, '95, '96.)
2. Write a short account of Mr. Quick's views of the teaching of the Jesuits, and criticise them. (1892, '93.)
3. How did Ascham teach Latin? (1892.)
4. Write a short account of Mulcaster's life, writings, and educational ideas. (1892.)
5. Explain and illustrate the chief educational dogmas of Ratichius. (1892, '94.)
6. State what you know about Sturmius and his teaching. (1894, '95 '96.)
7. Describe the use made by the Jesuits of memory in school, and show its advantages and disadvantages. (1894.)
8. Write a summary of the chapter on Ascham. (1894, '96.)
9. Explain fully the methods of teaching followed by the Jesuits. (1895.)
10. Describe the method of Ascham. (1895.)
11. Compare Ratke's method with Ascham's. (1896.)

The many readers of this section who are sending their answers to be revised to Mr. Cartwright, will save a post by writing direct to 31, Park Hill Road, East Finchley, London, N., instead of to the office of the PRACTICAL TEACHER as heretofore. They are also requested to enclose a stamped directed envelope for the return of their MSS., and to number each page.

CORRESPONDENCE.

L.L.A. Comparative Religion.—The meaning of the clause is that you may choose either Semitic or Persian religion, and that if you choose the former you will read the following books:—(1), 'Religion of the Semnites,' by R. Smith; (2), 'The Old Testament in the Jewish Church,' by the same author; and (3), Sayce's 'Hibbert Lectures.'

QUERY COLUMN.

RULES.

1. **Each correspondent is restricted to *one* question.**
2. **Each query must be accompanied by the *coupon* which appears on the back wrapper of the current number of the Journal.**
3. **CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.**

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

C.H.F.—If $r < 1$ and positive, and m is a positive integer, show that $(2m+1)r^m(1-r) < 1 - r^{2m+1}$. Hence show that nr^n is indefinitely small when n is indefinitely great.

(Hall and Knight's 'Algebra,' p. 46.)

$$(2m+1)r^m(1-r) < 1 - r^{2m+1}$$

$$\text{if } (2m+1)r^m < \frac{1 - r^{2m+1}}{1-r}$$

i.e., if $(2m+1)r^m < 1 + r + r^2 + r^3 + \dots r^{2m}$,

i.e., if $(2m+1)r^m < 1 + r + r^2 + \dots + r^m + \dots + r^{2m}$,

i.e., if $2mr^m < 1 + r + r^2 + \dots r^{m-1} + r^m + 1 + \dots + r^{2m}$,

i.e., if $2m < \frac{1}{r^m} + \frac{1}{r^{m-1}} + \frac{1}{r^{m-2}} \dots \frac{1}{r} + r + r^2 + \dots r^m$,

i.e., if $2m < \left(r^m + \frac{1}{r^m}\right) + \left(r^{m-1} + \frac{1}{r^{m-1}}\right) + \dots + \left(r + \frac{1}{r}\right)$.

Each expression on the right is of the form 'a number + its reciprocal,' and there are m such expressions.

We are going to prove that each is greater than 2 if r is positive, hence $2m$ is certainly less than $m \times$ (something greater than 2).

If r is < 1, $r^m < 1$ if m is positive, therefore each of the expressions is of the form $x + \frac{1}{x}$, where x is < 1 and positive.

Now why is $\left(x + \frac{1}{x}\right) > 2$?

Well, since x is < 1, put $x = 1 - a$, then

$$\left(x + \frac{1}{x}\right) = \left(1 - a + \frac{1}{1-a}\right) = \frac{1 - 2a + a^2 + 1}{1-a}$$

$$= \frac{2 - 2a + a}{1-a} = 2 + \frac{a}{1-a},$$

which is greater than 2, since a is evidently positive. Hence we have proved what was required.

Since $$(2m+1)r^m < \frac{1 - r^{2m+1}}{1-r},$$

then $$(2m+1)r^{2m+1} < \frac{r^m + 1 - r^{3m+2}}{1-r}.$$

Since r is a proper fraction, the numerator on the left gets less and less as m gets greater and greater, hence $(2m+1)r^{2m+1}$ (or mr^m) approaches zero as m gets greater and greater.

H.H.S.—A man leaving his property by will to his three sons, left a third of it and £1,000 to the eldest; a half of remainder and a £1,000 to the second; and the rest to the third, who found that his share amounted to £2,500. What was the total value of the property?

Let $3x$ = value of property.

Then $x + 1000$ = share of eldest son.

There remains $2x - 1000$, and of this the second son receives $(x - 500) + 1000$, or $x + 500$. The remainder is therefore $3x - (x + 1000) - (x + 500)$, or $x - 1500$. But this is £2,500, therefore

$x - 1500 = 2500$, or $x = 4000$, and therefore $3x = 12000$.

Nic.—If 6 men and 2 boys can reap 13 acres in 2 days, and 7 men and 5 boys can reap 33 acres in 4 days, how long will it take 2 boys and 2 men to reap 10 acres?

Suppose 1 man can do the work of x boys.

Then $(6x + 2)$ boys do 13 acres in 2 days, or $\frac{13}{2}$ acres in 1 day.

Hence 1 boy does $\frac{13}{2(6x+2)}$ acres in 1 day. Again, $(7x + 5)$ boys do 33 acres in 4 days, or $\frac{33}{4}$ acres in 1 day, hence 1 boy does $\frac{33}{4(7x+5)}$ acres in 1 day.

Therefore $$\frac{33}{4(7x+5)} = \frac{13}{2(6x+2)}.$$

$$\therefore 396x + 132 = 364x + 260.$$

$$32x = 128.$$

$$x = 4.$$

From the first statement it therefore follows that 26 boys do 13 acres in 2 days, that is, 1 boy does $\frac{1}{2}$ acre in 2 days, or $\frac{1}{4}$ acre per day, or 1 acre in 4 days. Hence 2 men and 2 boys, that is, 10 boys, will do 10 acres in 4 days.

L. Auker.—Find a number which when multiplied by 37 and divided by 31 leaves a remainder of 15.

You may try all numbers from 1 upwards; this is a tedious process, but you would find that 18 satisfied the question.

The following is one method of finding such a number:—

Let x = the number;

then $\frac{37x}{31}$ = some whole number, say y, $+ \frac{15}{31}$;

or, $37x = 31y + 15$.

This is an indeterminate equation, and integral values of x and y which satisfy it may be found as follows:—

We have $31y = 37x - 15$.

Divide through by the smaller coefficient 31 and we get

$$y = x + \frac{6x}{31} - \frac{15}{31} = x + \frac{6x - 15}{31}.$$

Since y and x are whole numbers, $\frac{6x-15}{31}$ must be a whole number. Let it equal m, then $\frac{6x-15}{31} = m$, or $6x - 15 = 31m$. Divide through by the smaller coefficient 6, then $x = 5m + 2 + \frac{m+3}{6}$. Similarly it follows that $\frac{m+3}{6}$ is a whole number, say n, so that $m + 3 = 6n$, or $m = 6n - 3$.

Working backwards with the object of expressing both x and y in terms of n, we obtain

$$x = 5m + 2 + \frac{m+3}{6} = 30n - 15 + 2 + n = 31n - 13.$$

Also $y = x + \frac{6x-15}{31} = x + m = 31n - 13 + 6n - 3 = 37n - 16$.

Thus we have $x = 31n - 13$

$y = 37n - 16$.

Put $n = 1, 2, 3$, etc., and $x = 18$, $y = 21$;

$x = 49$, $y = 58$, etc.

So that 18 is the least number satisfying the question.

A.W.B.—(*a*) A heavy particle, which is attached by a string four feet long to a fixed point, swings freely around this point in a vertical circle. If the tension on the string, when the particle is at the highest point, be equal to the weight of the particle, find the greatest and least velocity of the particle.

(*b*) A smooth hemispherical bowl, standing upright, has a string equal to its radius attached to its edge, the other end of the string being attached to a heavy particle resting against the bowl. Find the tension of the string and the pressure against the bowl.

(R.U.I., 2nd Arts.)

(*a*) The tension on the string (in lbs.) when the body is at its highest point is the centrifugal force (in lbs.) minus the weight of the body (in lbs.), thus we have C.F. $-$ W $=$ W.

Or C.F. $= 2$W.

But C.F. $= \frac{Wv^2}{gr}$ in lbs.

$$\therefore \frac{Wv^2}{gr} = 2W.$$

$$i.e.\ v^2 = 2gr = 64{\cdot}4 \times 4.$$

$$v = 16{\cdot}05 \text{ ft. per sec.}$$

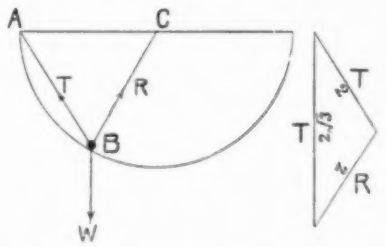
This is the least velocity, namely, when in highest position.

The kinetic energy in its lowest position (that is, where it has maximum velocity v_1) is equal to its kinetic energy in highest position, together with 8W foot lbs. gained in falling from highest to lowest level. Putting this into symbols we have—

$$\frac{Wv_1^2}{2g} = \frac{W \times (16{\cdot}05)^2}{2g} + 8W;$$

$$\therefore v_1^2 = (16{\cdot}05)^2 + 8 \times 2g = 257{\cdot}6 + 515{\cdot}2.$$

$$\therefore v_1 = 28 \text{ feet per sec. nearly.}$$



(*b*) From the figure it will be seen that there are *three* forces which keep the particle at rest, viz., T, the tension in the string, W, the weight of the particle, and R, the reaction of the bowl, the direction of the latter being along a radius. Draw a triangle with its sides parallel to the lines of action of these forces; the sides of this triangle are proportional to T, W, R. From this triangle, it is evident that

$$\frac{T}{W} = \frac{2}{2\sqrt{3}} \text{ and } \frac{R}{W} = \frac{2}{2\sqrt{3}}$$

because the triangle ABC is equilateral.

Hence $$T = R = \frac{W}{\sqrt{3}} = \frac{W}{3}\sqrt{3}.$$

Nic.—A boat's crew row over a course of a mile and a quarter against a stream which flows at the rate of 2 miles an hour in 10 minutes. The usual rate of the stream is $\frac{1}{2}$ mile an hour. Find the time which the boat would take in the usual state of the river.

(Hamblin Smith's Exam. Papers.)

$1\frac{1}{4}$ miles in 10 minutes is $1\frac{1}{4} \times 6$, or $7\frac{1}{2}$ miles an hour. This is the rate at which they actually advance; therefore they must pull at the rate of $9\frac{1}{2}$ miles an hour *in still water*.

If the stream moved at ½ a mile an hour, the crew would really advance at the rate of 9 miles an hour, hence to go 1½ miles would take

$$\frac{1\frac{1}{2}}{9} \text{ hours, } i.e., \frac{5}{36} \text{ hour, or } 8\tfrac{1}{3} \text{ minutes.}$$

Tim.—Find the side of an isosceles right-angled triangle whose area is one-tenth that of the surface of the sphere.

(2nd Arts. R.U.I., 1896.)

Please say which sphere, as the problem is indefinite.

Puzzled.—If $s = pn + qn^2$ whatever be the value of n, find the mth term. (Todhunter.)

This is a type of example in which you can find what is required by giving to n the values 1, 2, 3, etc. Thus, put $n = 1$, and we get the sum of *one* term is $p + q$, that is, the *first term* is $p + q$. Put $n = 2$ and the sum of *two* terms is $2p + 4q$; hence the *second term* is $2p + 4q - (p + q)$, or $p + 3q$; therefore the difference between the first and second terms is $p + 3q - (p + q)$, that is, $2q$. Similarly when $n = 3$, $s = 3p + 9q$, from which it follows that the *third term* is $3p + 9q - (2p + 4q)$, or $p + 5q$. In this way we get the arithmetical progression

$$p + q,\ p + 3q,\ p + 5q,$$

the mth term of which is $p + q + (m - 1)2q$.

Corns.—Show that if $ax^3 + bx^2 + cx + d$ and $a^1x^3 + b^1x^2 + c^1x + d^1$ have a common quadratic factor in x, then will

$$\frac{ba^1 - b^1a}{ad^1 - a^1d} = \frac{ca^1 - c^1a}{bd^1 - b^1d} = \frac{da^1 - d^1a}{cd^1 - c^1d}$$

(C. Smith's 'Algebra,' Ex. VIII.)

Let $ex^2 + fx + g$ be the common quadratic factor; then

$$ax^3 + bx^2 + cx + d = (ex^2 + fx + g)(px + m). \quad (1)$$

and

$$a^1x^3 + b^1x^2 + c^1x + d^1 = (ex^2 + fx + g)(qx + n). \quad (2)$$

Since the R.H.S. and L.H.S of (1) are the same identically, we have, equating coefficients of like terms,

$$a = ep. \qquad a^1 = eq.$$
$$b = me + fp. \quad \text{also} \quad b^1 = ne + fq.$$
$$c = mf + gp. \qquad c^1 = nf + gq.$$
$$d = gm. \qquad d^1 = gn.$$

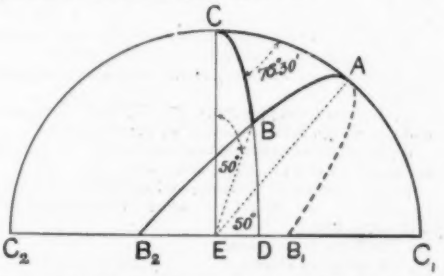
$$\therefore \frac{ba^1 - b^1a}{ad^1 - a^1d} = \frac{eq(me + fp) - ep(ne + fq)}{gnep - gmeq}$$
$$= \frac{e^2qm + efpq - e^2pn - efpq}{ge(pn - mq)} = \frac{e^2(qm - pn)}{ge(pn - mq)}$$
$$= -\frac{e}{g}.$$

Similarly the other two fractions are easily proved to be each equal to $-\frac{e}{g}$.

Porthos.—B and A are two stations on the same side of the equator; their latitudes and longitudes are known; show how to calculate the longitudes of the points in which the great circle through BA cuts the equator.

The latitudes of B and A are 40° and 50° N.; their longitudes 76° 30′ W. and 0° W.; find the longitudes of the points in which the great circle through BA cuts the equator.

The figure shows a hemisphere, C_1C_2 is the equator; CAC_1 is taken as the meridian of 0° W.; on this is A, such that AC_1 is an arc of 50°. The meridian CBD is 76° 30′ W., and on it is B, such that BD is an arc of 40°, and therefore CB is 50°. The great circle through B and A meets the equator in B_2 and B_1 to the W. and E. respectively of C_1.



The method is to (1) solve the triangle ABC, knowing that C = 76° 30′, $a = 50°$, $b = 40°$, that is, find A and B. (2) Now consider AB_1C_1, in which A has just been found, C_1 is 90° (of course C_1B_1 being on the equator east of C_1 is at right angles to C_1AC), $b = 50°$; thus a or C_1B_1 can be found.

Or, having found B, we might consider the triangle BDB_2, in which we know B, D, and $b_2 = 40°$; thus we could solve for B_2D, which, added to C_1D (*i.e.*, 76° 30′), would give the longitude of B_2.

(1) To solve ABC, use the formulæ—

$$\text{Tan } \tfrac{1}{2}(A + B) = \frac{\cos \frac{1}{2}(a - b)}{\cos \frac{1}{2}(a + b)} \cdot \cot \frac{C}{2}.$$

$$\text{Tan } \tfrac{1}{2}(A - B) = \frac{\sin \frac{1}{2}(a - b)}{\sin \frac{1}{2}(a + b)} \cot \frac{C}{2}.$$

These give A = 60° 39′ 22·7″, B = 51° 53′ 1·5″.

(2) In solving AC_1B, use the formula for a right-angled triangle,

$$\tan a = \tan A \sin b,$$

where $a = C_1B_1$, A = 69° 39′ 22·7″, $b = 50°$.

This gives $a = 64°\ 10'\ 17{\cdot}8''$ E. of C_1, consequently

$$C_1B_2 = 180 - 64°\ 10'\ 17{\cdot}8'' = 115°\ 49'\ 42{\cdot}2''\ \text{W.}$$

X. Y. Z.—A body turns round a fixed axis under the action of any forces; find the angular acceleration.

ABC is a uniform rod bent at right angles at B, and AB is equal to BC; it can turn freely round a horizontal axis through A parallel to BC; it is allowed to swing backwards and forwards; find the angular acceleration and the angular velocity in any position.

(Honours, Theo. Mechs., Solids, 1897.)

There are two formulæ for linear and angular motion respectively, which may conveniently be remembered side by side.

(1) *Linear motion.*—If a force F act on a body of mass M and give to it a linear acceleration a, then

$$F = Ma,$$

the force F being in the direction of motion.

(2) *Angular motion.*—If a force F (F may be considered as the resultant of *many* forces which act) act on a body which is turning about an axis, then if I is the moment of inertia of the body about the axis, and a is the angular acceleration, then

$$\text{Moment of F about axis} = Ia.$$

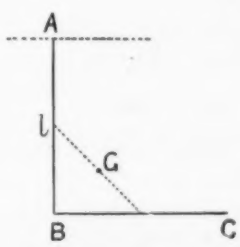
So that the force, mass, and *linear* acceleration in (1) are replaced by a moment of a force, moment of inertia, and *angular* acceleration.

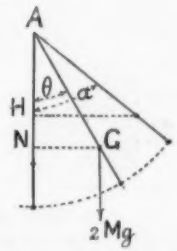
Hence if a body is moving about an axis under the action of one or more forces, to find the angular acceleration, divide the sum of the moments of the forces by the moment of inertia of the body. We have not *proved* anything here, but merely stated the well-known formulæ.

Now for the bent rod; the moment of inertia for AB is $\frac{M\ell^2}{3}$, where M is the mass and ℓ the length of AB; while that for BC is $M\ell^2$, their sum is $\frac{4}{3}M\ell^2$.

Let a be the angular acceleration when the whole rod is at an angle θ; let G be the centre of gravity. Then the force F above-mentioned is the weight $2Mg$ of the rod acting at G, and its moment is $2Mg \times GN = 2Mg(\frac{2}{3}\ell \sin\theta)$; hence

$$2Mg \cdot \tfrac{2}{3}\ell \sin\theta = Ia = \tfrac{4}{3}M\ell^2 \cdot a.$$
$$\therefore a = 2Mg \cdot \tfrac{2}{3}\ell \sin\theta \div \tfrac{4}{3}M\ell^2$$
$$= \frac{9}{8} \cdot \frac{g}{\ell} \sin\theta.$$





The rod will oscillate through a definite angle α on each side of the central position. Supposing that it has started from its highest position and is returning, then when it is at an angle θ, as before, its kinetic energy is $\frac{1}{2}I\omega^2$, where ω is the angular velocity. But the work done in producing this energy is the weight of the rod multiplied by the height through which the centre of gravity falls; the latter distance is HN = AN − AH $= \frac{2}{3}\ell(\cos\theta - \cos\alpha)$.

Hence we have

$$\tfrac{1}{2}I\omega^2 = 2Mg \times \tfrac{2}{3}\ell(\cos\theta - \cos\alpha),$$

from which

$$\omega = \tfrac{2}{3}\sqrt{\frac{g}{\ell}(\cos\theta - \cos\alpha)}.$$

If *Horma*, *C. H. F.*, and *J. Anning* will kindly send names and addresses to Editor, solutions to queries shall be posted by return.

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Head Master of the Belvedere Pupil Teachers' Centre, First on Scholarship List, Author of 'Scholarship School Management.'

PUPIL TEACHERS' COURSE.

AUTUMN EXAMINATION, 1898.

FIFTH MONTH, FEBRUARY.

WORK TO BE PREPARED.

A.—*English.*

(Students are invited to write for assistance in cases of doubt or difficulty.)

First Year.

1. Prepositions and Conjunctions.
2. Latin Verb suffixes—meaning and function.
3. Prepare lines 160–193 of the 'Lay of the Last Minstrel,' with all meanings and allusions, etc.

Second Year.

1. The Adverb. Prepare a good classification with Definitions.
2. Greek Prefixes.
3. Prepare lines 558–612 of the 'Winter Evening.' *Task.* Book IV. Pay special attention to the paraphrase. Send up all difficulties for solution.

Third Year.

1. Learn 20 roots and meanings each week.
2. Prepare lines 359–440 of 'Comus.' Pay special attention to the paraphrase. Learn derivation of all important words.

Notes. '*Lay of the Last Minstrel.*' :—

Line 161. Adverbial sentence of Reason.
162. 'Where it was hid.' = Noun sentence.
163. *Save.* Some difficulty may be experienced in parsing this word. In this case it may be considered a preposition, but it would be well to make a note that *save* is the old participle '*saving*,' which was used in the sense of 'except.' Thus it is often followed by a Nominative Case absolute; *i.e.*, 'Save only he,' that is, 'He alone being saved, (excepted).
167. *Red.* Adj., qualifying floor predicatively. This is another peculiarity which may present difficulty. It is very usual to find after Passive Verbs and Intransitive Verbs an Adjective, or its equivalent, which completes the sense of the Predicate, and in analysis forms the 'Completion of the Predicate.' Cf., 'The house was painted *white*,' 'He turned *pale*.' Note, these words are *not* Adverbs.
170. Adverbial sentence of Reason.
171. Supply—('and that it might) scare,' etc.
173. Adverbial sentence of Time.
177. 'You.' Indirect or Dative Object. Direct Obj. = Noun sent. 'that . . . . steed.'
178. 'Than.' Conjunction, Comparative (*i.e.*, Than William of Deloraine was).
180. 'Yet.' Conj. Advers.
'Somewhat.' Adverb of Degree modifying 'chilled.'
182. 'Lo.' Interjection.
187. Adverbial sentence of time—modifying 'shall burn.'
'Shall be' = Predicate, *be* in this case being capable of forming Predicate without any completion.
193. 'To expand.' Infinitive, qualifying 'sign.'

'*The Task*,' *Book IV. General Paraphrase.*

Line 513.—The presence of such scenes makes one long to have lived in the Golden Age sung by the poets, amongst those scenes of simple rural life so eloquently described by Virgil and Sidney, when girls were as virtuous as Diana, and their lovers paid them that respectful homage which is the due of true womanliness. Then, Innocence, banished from the court and crowded cities, betook herself to the rural woods and fields, and exerted her influence, not without success, on those dwelling there, so that profane speech, oaths and curses, debauchery and licence were totally unknown; or, if a solitary case did occur, it was regarded as something unnatural, and was by precept and example soon corrected.

Line 525.—Alas! an idle wish, since such a state of happy innocence never existed but in the brain of the imaginative writers, who often depicted what they ardently desired, and described in glowing words a beautiful and charming dream. Nevertheless, I envy these writers their times when they could imagine such delightful scenes, for at the present day the continual forcing upon our sight of all the vile sin and disgusting debauchery renders such imaginations impossible and entirely ridiculous.

Line 534.—The manners of the city have contaminated the quiet and blissful ignorance of the country. The country girl, neat and graceful, innocent and dignified in her modesty, who closely resembled the shepherdess of Arcadian days, is now no longer to be found. She appears to-day a travesty of a fashionable lady. Her hair is built up by the aid of false hair and the wig-dresser into a huge and hideous tower, ornamented by streaming ribbons and laces; the sleeves of her dress reach only to the elbow, and are terminated in ruffles and frills; and the heels on her French shoes are so high that it is with difficulty that she hobbles along. One might at first sight take her to be of a rank and position far above farm or dairy work but for the basket which is carried on her arm and which indicates her occupation. Possibly in a short time she may be seen with a page boy in attendance to carry her basket, when she will be able to give all her attention to the holding up of her long train and the manipulation of her umbrella.

Line 553. The vices of the large towns have spread into rural districts, and there become more noticeable as appearing in the midst of purity and innocence, and the manners of town life have supplanted the hardy simplicity of former days. In bygone times there was no necessity in these rural spots to bolt and bar the door: men neither sought to steal others' goods nor protect their own from theft. Sleep passed undisturbed by any apprehension of danger or the noise of drunken riot; the tale of a midnight murder was received with undisguised wonder, or scarcely credited at all. But now this age of trustful innocence has gone, and it is necessary before retiring to rest to examine and reload all available firearms, and carefully secure all doors. It is quite possible that you may be aroused by the crowing of the cock to hear within your house the noise of burglarious ruffians. Nor is the danger limited to darkness only, for it is perilous to take a stroll through the quiet fields and woods which once contained nothing more alarming than the feathered songsters.

Line 576. This change is very much to be regretted, and has been produced by a variety of causes which are apparently ineradicable. The gradual deterioration of a country always proceeds by the same stages. As soon as a country becomes powerful it naturally becomes rich; the excess of riches is expended in luxurious habits which soon overstep the bounds of moderation and become intemperate. These habits attack first of all the wealthy, and are soon copied by those in the next stage of wealth, and so on downwards till the whole nation is affected, from the highest and noblest to the lowest and most ignorant. The class to whom the government of rural districts is entrusted, and who alone can hold the lowest stratum of society in check, desert their homes to flock into the cities, thus leaving the country population with no rulers at all. And even those who do not leave their homes not unfrequently witness excesses and disorders without any attempt to check or punish them. For instance, the parson, who from the nature of his profession is to some extent bound to remain at home, devotes his life to pleasure and good living, and although entrusted as a magistrate with some degree of useful power, neglects to use it, or the moral influence which he should have, from habitual carelessness and laziness. Or it may be that he is afraid to punish wrong-doers, and allows criminals to depart unscathed, from the dread of retaliation at the hands of their comrades. Or again, although from his profession he should be absolutely disinterested and clean-handed, he may possess the itching palm which would not be associated with his exterior appearance. He is not ashamed to accept bribes to divert the current of justice, and, this being known, any person appearing before him in his magisterial capacity takes care to bring some offering of venison, fish, or game, and he is then pretty sure of obtaining a verdict in his favour.

B.—*Arithmetic.*

First Year.

Boys.—Continued exercises in Complex and Compound Fractions, etc.

Girls.—Compound Practice.

Second Year.

Boys.—Stocks.

Girls.—Complex and Compound Fractions.

Third Year.

Boys.—General problems.

Girls.—Problems relating to time and work.

C.—*Music.*

First Year.—Accent. Two, three, and four-pulse measures.
Second Year.—Third of a pulse.
Third Year.—Common musical terms (one-half).

D.—*Geography.*

Scotland.—Prepare thoroughly. Draw maps for each separate section. Pay special attention to industries and towns employed in them. Read up from Geographical Readers or any books of travels in Scotland.

E.—*History.*

Edmund to the Norman Conquest.
Chief points :—

(1) Learn all dates. Note relationship of the kings to one another.

(2) The long struggle with the Danes, the results of which were :—

(*a*) Growth of the kingly authority, the king becoming the lord or patron of the people.

(*b*) Growth of a military aristocracy, ceorls superseded by thanes.

(*c*) Gradual disappearance of 'folcland' (common land) and conversion into 'bocland,' or private estates.

(*d*) Gradual disappearance of the 'ceorl' or freeman, from the necessity of obtaining protection.

(*e*) Destruction of learning and decline of religion.

(3) Dunstan and his reforms of the church—the first great church statesman.

(4) The Danish conquest.

(5) The reign of Canute.

(6) Edward the Confessor and his claim to the throne (very important).

(7) The Norman influence during his reign and the results of this.

(8) Harold and the Norman invasion.

(All students should read Lytton's 'Harold' in connection with this period.)

F.—*Euclid.*

Second Year.—Props. 13–16, with two deductions per week.
Third Year.—Props. 44–48, with four ,, ,,

G.—*Algebra.*

Multiplication and division of fractions. Use factors wherever possible; this will abbreviate work to a considerable extent.

H.—*Teaching.*

Second Year.—Chap. IV. 'Scholarship School Management.' The Teaching of Reading.

Third Year.—Chap. XII. 'Scholarship School Management.'

QUESTIONS TO BE ANSWERED.

1. *Penmanship.*
(*a*) Largehand—Judicature, Kilogramme, Llewellyn, Mythological.
(*b*) Smallhand—
Storied windows, richly dight,
Casting a dim religious light.

2. Write an essay each week.
(*a*) The army.
(*b*) The duties of a citizen.
(*c*) Social life in Anglo-Saxon times.
(*d*) Description of some historical building.

3. *English.—First Year.*
(*a*) Analyse lines 137–149.
(*b*) Parse—
'When him listed his magic wand to wave,
The bells would ring in Notre Dame.'
(*c*) What is the meaning or use of the parts italicised in these words—His, Clear*er*, Wid*en*, Child*ish*, My*self*, Rivu*let*, Whom?

Second Year.
(*a*) Paraphrase 513–524, and 540–552.
(*b*) Analyse 518–524, 529–533, 546–552.
(*c*) Parse—
That to suppose a scene where she presides
Is tramontane. That she was hardly less
Than the fair shepherdess.
(*d*) Give the derivation of the following words:—*persecutes, temperance, undecisive, innocence, voracious, destitute, pernicious, unguarded.*

Third Year.
(*a*) Paraphrase and analyse—
(1) *Two such I saw . . .*
. . . . . to help you find them.
(2) *Unmuffle, ye faint stars*
. . . . Tyrian Cynosure.
(*b*) Parse—
(i) *Than wantst to love the traveller's benison.*
(ii) *What need a man forestall his date of grief.*
(iii) *Imports their loss, beside the present need?*
(*c*) If there is anything wrong in the following sentences, correct, and give reasons:—
There let him lay.
No female is permitted to approach Mount Athos.
A mutual silence prevailed.
He brought me a verbal message
I like him as well or better than his brother.
He intended to have written to me yesterday.
I quite agree with you.
Nobody will miss him like I shall.
He is a good sort of man.

4. *Arithmetic.—First Year.—Boys.*
1. Simplify $1\frac{9}{14}\frac{8}{8}\frac{4}{8}$ of $\{\frac{7}{10}$ of £$3\frac{3}{14}$ + 6$\frac{3}{5}$ of £3 0s. 9d. — $4\frac{1}{3}\frac{3}{3}$ of £3 2s.$\}$ Ans. £10 8s. 0d.

2. Copper weighs 550 lb and tin 462 lb. to the cubic foot. What will be the weight of a cubic foot of a mixture of 6 parts copper to 5 parts tin? Ans. 510 lb.

3. In a paper a sum was printed thus—
Add together $\frac{1}{14\frac{2}{3}}$, $\frac{1}{19\frac{1}{4}}$, , $\frac{1}{13\frac{1}{4}}$,
the denominator of one fraction being omitted. The answer was $\frac{1}{18}$. Find the missing denominator. Ans. 5.

4. Find the rent of an estate whereof $\frac{5}{12}$ are let at £2 3s. an acre, and the remainder, consisting of 20 acres 3 rds. 12 pls., at £1 16s. 8d. an acre. Ans. £70 3s. 2½d.

Second Year.—Boys.
1. A farmer rents 400 acres on the following terms: He pays as rent 100 qrs. of wheat at 49s. 6d. per qr., 75 qrs. of barley at 30s. 8d. per qr., and 60 qrs. of oats at 19s. 2d. per qr. Give his average rent per acre in £ s. d. Ans. £1 1s.

2. A draper bought a certain quantity of cloth; half of it at 2s. 3d. per yd., quarter at 3s. 4d. per yd., one-sixth at 3s. per yd., and the rest at 3s. per yd. Find the average price per yd. Ans. 2s. 8½d.

3. A general having lost $\frac{3}{8}$ of his men in battle, and 7 per cent. of the remainder by sickness, found he had 18,414 left; how many had he at first? Ans. 21,166.

4. A clock starts at 12 o'clock and loses at the rate of 4 per cent. What is the real time when the hands are next again together at 12? Ans. 12.30.

Second Year.—Girls. (As First Year Boys.)

Third Year.—Boys.
1. A person has an income of £122 10s. from 3½ per cent. stock; he sells at 92, and invests his principal in stock at 95 which yields 5½ per cent. What will his income be? Ans. £177$\frac{1}{2}\frac{5}{2}$.

2. The volume of a cubical block is 60698·457 cubic feet. Find the area of one of its faces. Ans. 1544·49 sq. ft.

3. Find a fraction whose denominator exceeds its numerator by 7, and if 5 be added to each term, the fraction is equal to $\frac{3}{4}$. Ans. $\frac{1}{1}\frac{0}{7}$.

4. A broker deducts 4½ per cent. of the amount of a bill due in 12 months. What interest per cent. per annum does he really make on his money? Ans. $4\frac{1}{3}\frac{7}{9}$ per cent.

5. *First Year.*—What are the mental effects of **r, l, n, s, t**?

Second Year.—Re-write the following, halving the value of each note and rest:—

| d :d .d | n. : .s | l .s:n | f .n:r. | d :— ‖

Third Year.—Which of the following is highest in pitch, and which lowest?—
te in Key G, *fak* in Key B flat, *ray'* in Key D, *soh*$_1$ in Key C, *ray*$_1$ in Key A flat.

6. Draw a map of Wales.

7. Describe a coasting journey from Newport to Llandudno.

8. Give an account of the mountain system of Wales.

9. What industries are carried on in Wales? Enumerate the chief towns engaged in them.

10. Under what kings were the kingdoms of Northumbria and Mercia respectively prominent? Point out the boundaries of both kingdoms at their fullest extent.

11. Say what you can of three of the following:—Athelstan, Offa, Bede, Regnar Ladbrok, Augustine.

12. *Second Year.*—What are the chief uses of the blackboard as an aid to teaching?

13. *Third Year.*—Point out how you would give a first lesson on the United States, and write down briefly a summary of the lesson, such as would appear on a blackboard.

SPRING EXAMINATION, 1898.

TENTH MONTH—FEBRUARY.

WORK TO BE PREPARED

A.—*English.*

First Year.
Prepare lines 308–383 ('Lay of the Last Minstrel'), with all meanings, allusions, &c.
Revise suffixes and tabulate those in the first 150 lines of the poem.

Second Year.
1. Tabulate prefixes in the next 100 lines of 'The Task.'
2. Prepare lines 780–801 ('Task' Book IV.), with derivations of all important words, meanings, allusions, etc.

Third Year.
1. Learn 20 roots and meanings per week.
2. Prepare lines 860–956, 'Comus,' with meaning of all allusions and the derivations of all important words.

Notes. '*Lay of the Last Minstrel.*'

Line 309. *hear* — Subjunctive Mood—generally found in a clause introduced by *lest*. See also in line 311.
311. *round* — Adv.
315. *To meet* — Infinitive of Purpose gov. by 'glides.'
319. *To meet* — Gerundial Infinitive. Residual obj. of 'were seen.' When a verb takes a double object in the Active Form, one only of these can become the subject of the Passive, the other is left with practically no case, and is usually termed the Residual Object.
322. *She*. Note that by change of construction, this word is left without case.
322. *Scarce* — scarcely—Adv.
327. *Shaded* — Passive Participle qual. 'eyes.'
329. Supply *who*.
330. *Methinks*.—A word sentence, governing a noun clause. Analyse *it* — Subj. thinks — Pred., me — Dative or Indirect Obj., the Noun Sentence following — Dir. Obj.
331. *You* — Obj. Case gov. by 'see.'
listen — Infinitive mood gov. by 'see.'
334. The object of 'ween' = 'to hear' followed by all lines down to 345.
337. *To paint* = Gerundial Infinitive.
338. *might expire*. Subj. Mood.
339. Supply 'he would.'
343. *might be stayed*. Subj. Mood.
344. *Only* = Adj. him 'he.'
352. *Eld* = old age. Abs. Noun. Obsolete except in poetry.
355. *Scarce* = Adv. mod. Earthly.
358. *A hunting*. A = on, *i.e.*, on hunting, a Preposition and a Gerund.
359. *But* = Adv. mod. rarely.
Trode = Trodden. Participle qual. glens.
366. *Some whit* = some what, to some extent. May be parsed together as Adv. of Degree.
367. *Rade* = North country for rode.
368. *Torid* — Infinitive of purpose.
371. *it* = Impersonal Pro. cf. l. 367.
373. *little* and *less* = Adverbs of Degree.
379. *full* = Adv. of Degr., limiting fain.
fain = Adj. qual. '*he*' Predicatively.
381. An = If. Conjunction.

General paraphrase of '*The Task*' (cont.).

Line 780.—Such are the reasons, therefore, why I sing the praises of a country life, which is productive of health and happiness, and especially suited for quiet contemplation and those harmless pleasures which are unknown to those who pass their lives in great cities.

I shall not become a competitor in the struggle for honour, wealth or fame, nor shall I obstruct those who are working with that aim, nor envy those who attain it. That some must stand forth pre-eminent above others I recognise and fully admit. Different positions demand various degrees of ability, and hence God has bestowed on men a diversity of character and attainment which fits each for some particular position he is destined to fill.

To the patriot has been given a warm sympathy, a stirring eloquence, and an intrepid courage, to kings nobility, to judges the even mind which decides disputes and causes without bias, to artists a ready imagination to devise works of art and the ability to execute them. But to me has been given the blessing of quiet content, the faculty of observing, appreciating, and praising the works of nature and the facility for doing this which has been my lifelong desire.

B.—*Arithmetic.*

Work any problems and back papers.

C.—*Music.*

Revise all fully.

D.—*Geography.*

Australia.—Provinces, Towns, Population, Education, Forms of Government, with Tasmania fully.

Practice Memory Maps every week.

E.—*History.*

Henry III. and Edward I.

Chief points:

Note.—*Henry III.* falls into 3 periods.

1. Regency. Defeat of the French at Lincoln. Hubert de Burgh.
2. Period of Misgovernment. Peter des Roches and other favourites.
3. Barons Revolt and War. Provisions of Oxford. Battle of Lewes and Mise of Lewes. The first Parliament. Battle of Evesham and Dictum of Kenilworth.

Edward I. Note Judicial reforms—very important.

Statute of Gloucester, Quo Warranto Writs, Statute of Mortmain, 2nd and 3rd Statutes of Westminster. Statute of Winchester. The provisions of all these must be known. Reduction of Wales, Expulsion of the Jews. Reduction of Scotland.

Particular care must be taken with these reigns, as they are most important, especially Edward's Reforms.

De Montfort's Parliament.

The importance of the innovation made by De Montfort must be fully recognised. Under the Feudal System, *all* Tenants in Capite were entitled to attend the Great Council, but owing to the expense and distance many of the smaller barons ceased to attend, or to be expected to. When, by the Provisions of Oxford, Knights of the Shire were summoned, it was merely restoring their ancient privileges, the real and important change came when the burgesses were summoned to attend. No rule was laid down as to the towns entitled to send representatives, but all the large towns were directed by the sheriffs to send members at one time or another. Attendance was not looked upon as an honour at first, as it involved an expenditure of time and money, but as the power of Parliament increased the distinction was eagerly sought after. At first all sat together in one room, the Commons doing nothing but vote supplies; but in Edward III.'s reign the two Houses of Lords and Commons were formed and the Knights of the Shire joined the Commons, and from this union has sprung up the great middle class of England.

F.—*Euclid.*

Second Year.—Revise Problems 1–12 and work four deductions per week.

Third Year.—Revise Book I., 40–48, and four deductions per week.

G.—*Algebra.*

Work any back papers. Hall and Knight's Exercises (Macmillan & Co.) will afford plenty of practice.

H.—*Teaching.*

Second Year.—Chap. VIII. 'Scholarship School Management.'

Third Year.—Revise Chaps. IV.–VIII. 'Scholarship School Management.'

Read up also what is said about the various subjects in the Revised Instructions to H. M. I.

Questions to be answered.

1. *Penmanship.*
Largehand:—Quizzically.
Smallhand:—Sabrina fair, listen where thou art sitting.

2. *Composition.*
Write an essay each week.

3. *English*—First Year.
(1) Analyse Stanza XXIV. and parse *hardihood, for, like a load, full fain, as well as he might.*
(2) Analyse Stanza XXVII. and parse *dread, lest, hear, should waken, own knight.*
(3) Analyse Stanza XXIX. and parse *methinks, ween to hear, to paint, might expire, and only he.*
(4) Analyse Stanza XXXII. *he was full fain, as it had not been.*

5. Explain the following: *Ave Mary, Carter's side, kirtle, postern, the bloody feud, crested helm, between Home and Hermitage.*

Second Year.
(1) Paraphrase and analyse 713–717, and parse *the joy half lost because not sooner found.*
(2) Paraphrase and analyse 731–742, and parse *tutored with a relish more exact, none unmoved.*
(3) Paraphrase and analyse 750–761, and parse *Even* (753) *is still the livery she delights to wear.*
(4) Give the meaning of prefix, root, and affix in the following words:—*Enamoured, erroneous, entangled, ingredient, Discriminated, unadulterate, exuberant, compensating, supplemental.*

Third Year.
(1) Paraphrase and analyse 756–779, and parse 'but that this juggler would think to charm my judgment as mine eyes.'
(2) Paraphrase and analyse 805–813, and parse 'I must dissemble and try her yet more strongly.'
(3) Paraphrase and analyse 824–842, and parse 'For which the shepherds carol her goodness loud in rustic lays.'

4. *First Year. Boys.*
(1) Find the value of—

$$\frac{3\frac{1}{4} + 5\frac{1}{2} \div 11 - 2\frac{3}{4}}{1\frac{1}{2} \text{ of } 3\frac{1}{2} - \frac{1}{4}}$$

Ans. $\frac{1}{2}$.

(2) Simplify—

$$\frac{\frac{3}{8} \text{ of } 5\frac{1}{11} - \frac{5}{8} \text{ of } 4\frac{4}{17} + \frac{7}{10} \text{ of } 7\frac{9}{13}}{1\frac{1}{13}}$$

Ans. $745\frac{9}{17}$.

(3) Subtract $\frac{1}{16}$ of £8 1s. 2d. from ·0125 of £813 7s. 6d., and find by what quantity the result must be multiplied to produce £10 9s. Ans. £2 12s. 3d. ; 4.

(4) A man spent ·25 of his money, then ·4 of what was left, and afterwards ·3 of the remainder, and had £752 left. How much had he at first? Ans. £2,506 13s. 4d.

First Year. Girls.
(1) Find by practice the cost of 6 cwt. 3 qrs. 21 lbs. at £15 per ton, and explain by what other method besides practice this calculation could be made, and what is the advantage of doing it by practice? Ans. £5 4s. $0\frac{3}{4}$d.

(2) A person gives £5 to pay the following bill: $3\frac{1}{2}$ lbs. of bacon at $10\frac{1}{2}$d. per lb., 13 lbs. of cheese at $7\frac{3}{4}$d. per lb., $2\frac{1}{4}$ lbs. of tea at 3s. 3d. per lb., 17 lbs. of sugar at $5\frac{1}{2}$d. per lb., $8\frac{1}{2}$ lbs. coffee at 1s. $11\frac{1}{2}$d. per lb., and 29 lbs. of lard at $10\frac{3}{4}$d. per lb. What change should he receive? Ans. £1 9s. $2\frac{1}{4}$d.

(3) Find the G.C.M. of 119, 977, and 7,241, and prove by the steps of your working that no other number can be the G.C.M. Ans. 13.

(4) Explain clearly what you understand by each of the following terms:—Measure, multiple, G.C.M., L.C.M., and illustrate your answer by numerical examples.

Second Year. Boys.

(1) Define Ratio, Proportion, Antecedent, Consequent, Inverse, Reciprocal. What is the ratio compounded of the ratios 8 : 2, 9 : 3, and 10 : 5? Ans. 24 : 1.

(2) A tradesman sells tea at 2s. 1d. per lb. and takes off 5 per cent. for cash. Find what it cost him per cwt., sold for cash, in order that he may make a profit of 33 per cent. Ans. £8 6s. 8d.

(3) The present worth of a bill due 15 months hence at 4½ per cent. is £133 6s. 8d., true discount being charged. Find amount of the bill. Ans. £140 16s. 8d

(4) If £7,038 invested in 3½ per cent. stock yields an income of £252, what is the price of the stock (usual brokerage)? Ans. $97\frac{5}{8}$.

Second Year. Girls. (As First Year Boys.)

Third Year. Boys.

(1) What sum of money put out at $3\frac{3}{4}$ per cent. per annum, simple interest, will produce each quarter of a year £70 6s. 3d.? Ans. £7,500.

(2) A man invested £5,850 in the 3 per cents. at $97\frac{3}{8}$, when the stock rose to $99\frac{7}{8}$ he sold out. What did he gain (usual brokerage)? Ans. £67 10s.

(3) If A can do a piece of work in 30 days, in what time will A, B, and C together do it if A can do as much in seven days as B in eight, and B as much in five days as C in six days? Ans. $11\frac{13}{38}$.

(4) Show that $\sqrt{14\frac{2}{36}} = 3{\cdot}8\frac{1}{3}$.

Third Year. Girls.

(1) Simplify $\left\{\frac{8\frac{1}{2}+6\frac{2}{3}}{8\frac{1}{2}-6\frac{2}{3}} - \frac{8\frac{1}{2}-6\frac{2}{3}}{8\frac{1}{2}+6\frac{2}{3}}\right\} \div 4\frac{3}{7}$.

Ans. $1\frac{44}{289}\frac{0}{4}\frac{4}{7}$.

(2) Find the value of 2·375 of 1s. — $\frac{3}{5}$ of $\frac{7}{8}$ of 5s. 4d. + $\frac{1}{4}$ of 17s. 10d. + ·265 of £1 5s., and reduce the result to the decimal of £4 to five places of decimals. Ans. ·12447.

(3) Find a fourth proportional to $3\frac{1}{5}$, ·5, 1·75, and explain why the following proportion is incorrect: 3s. 7d. : 42 miles : : 7s. 1d. : 14. Ans. ·25.

(4) A man after paying an income tax of 6d. in the £ has £238 17s. 6d. left. What would he have left if the income tax had only been 4d. in the £? Ans. £240 18s. 4d.

5. Describe the basin of the River Murray.

6. What are the chief physical features, industries, and exports of South Australia?

7. What were the chief provisions of the Magna Charta, and by whose influence, and under what circumstances, was the charter obtained?

8. What was Romescot? By whom and for what purpose was it imposed?

9. *First Year.*—What is a pulse? What is a measure? When are double bars and brackets used?

Second Year.—When **s** becomes **d** what is the distinguishing note of the new key?

If the first note of the following passage be taken as **me** what will the others become:—

t l fe s l m fe s d' t.

Third Year.—In the scale **m bah se l t d' r' m'** name every minor 2nd, minor 3rd, diminished 4th, and major 2nd.

10. *Second Year.*—What are the essentials of a good system of writing?

Third Year.—It is said that history is best taught by biography. Make out a list of ten men whose lives would illustrate the history from Julius Cæsar to the Magna Charta.

SCHOLARSHIP EXAMINATION, 1898.

A list of reliable text-books was given in last month's issue, and each intending student should have obtained a sufficient supply to enable work to be started at once. Some few that were omitted are mentioned under the various subjects.

Method of Work.

The first essential for success next December is a well organised plan of work. It is impossible for any coach or tutor to do more than assist in the preparation; the majority of the work must be done by the student. We intend in these columns to map out the work into suitable sections per month, supply illustrative question and test papers, and supplement by notes, where necessary, the information given in the ordinary text-book, and to any student following exactly the course prescribed we guarantee a first class. The work must be regular. Spasmodic effort is never of any use. It is the steady student who is bound to succeed. A time table should be drawn up, and when modified to suit individual needs, should be regularly adhered to. In apportioning the time at disposal between the various subjects, care must be taken to give precedence to the difficult subjects, or those in which the student is weak. It is difficult to set a time limit for study, but earnest students should manage about three hours per day. Note books should be kept for each subject, and a careful digest made of the text-book. Alternate pages (only) should be used on a first reading, the other pages will then be available for notes, etc., obtained from other sources. No arrears of work must be allowed to accumulate, and nothing should be omitted or left till 'later on.' Some students find it useful to mark their text-books, distinguishing in some way the paragraphs which will need re-reading or those which may be omitted. The test questions should always be answered in a set time, and should be marked by some person competent to criticise and correct. If students desire it, the papers may be sent to me, monthly, and they will be returned marked, criticised, etc., for a fee of 1s. per month, or 7s. 6d. per annum. All those using this course are cordially invited to write for assistance in any matter, which will be given either in the columns of the paper or by post.

1. *Reading.*—The circular recently issued on this subject by the Department should receive careful attention, as doubtless the result will be to expect a higher standard than has hitherto been attained by candidates. Reading aloud should be steadily practised under the guidance of some capable teacher, and it would also be advisable to get one of the numerous books published on Voice Production and Elocution, and study that. An important part of the preparation for this examination is the general reading of classical English works, with which all should be familiar. Historical novels bearing on the history, journeys and explorations, essays and poetry, should all receive due attention. All can obtain for a few shillings a really useful library of standard authors, or wherever a free library is accessible no expense at all is incurred.

2. *Repetition.*—The lines to be recited should be selected at once, and committed to memory as soon as possible. As in Reading, something more is expected than the mere repetition of words. The meaning of the whole play or poem must be known, and the lines must be delivered with some amount of dramatic force. Probably most candidates will find it advisable to select lines from 'Julius Cæsar' or 'Comus,' with which they have had some acquaintance.

3. *Writing.*—This subject is one which demands continual care, not only with regard to copy-setting, but also in reference to the general handwriting. It is highly marked, it is generally inferior with P.T.'s, and it can be easily much improved. A copy book should always be used. Nelson's 'Royal Star,' Gill's 'Normal,' or Philip's 'Semi-upright,' will be found most convenient. Ten minutes' practice *per diem*, with continual care at all other times, would easily secure 90 per cent. of marks at least. The same kind of pen should always be used. A sample box of Brandauer's pens (4½d.) will be sure to contain a pen which will be found suitable. A change of pen generally means a change of style, hence the necessity for keeping to the same.

4. *Composition.*—This of all the subjects is perhaps the most important, not only on account of the marks obtained in the special exercise set at the examination, but because it largely affects all the written answers submitted. It is a subject which cannot be improved by learning a few rules, or by cramming immediately before any competition, but which must have long and very careful preparation. The most powerful aid is undoubtedly general reading of good authors. There are several books published which point out practically every mistake which could be made, but if these even were known by heart, it would affect the general style but very little. We write as we speak and think, and our speech and thought is to a very large extent a copy of what we have read. Hence to improve Composition, we must increase our knowledge of the thoughts of others, we must read with a purpose, we must, as Bacon says,

'chew and digest' what we read. Adequate knowledge is one essential of a good piece of composition, and an easy, correct, and vigorous style the other. Avoiding on the one hand a too simple style, and on the other an absurdly flowery and ornate manner, we must express our thoughts in forcible, well-balanced sentences, neither diffuse nor disjointed. This comes from the unconscious copying of what we have read. Take any essay of Charles Lamb ('Essays of Elia') or of Washington Irving ('Sketch Book'), or even of Macaulay, and after reading a part of it, endeavour to write the substance of it in your own words, and you will find that you have adopted many phrases and terms from the original, and used them unconsciously. In addition to these general remarks on the subject, the writing of an essay in a given time demands further consideration. Each student must have *ideas* on the topic proposed; these have to be called up and marshalled in proper order, then a plan of the essay can be sketched, and the essay written in paragraphs, each dealing with one point of the plan. In writing essays for practice, first read up all available facts, next make out a skeleton of what you intend to say, and then attempt the essay. The plans might well be kept in a little note-book, and although it is not likely that you will get at the examination one of those you have prepared, yet the practice of planning and analysing will influence your essay very materially. As a model of good if somewhat ornate English, Ruskin's 'Frondes Agrestes' may be studied.

For this month write essays on :—(1) Clouds and Winds; (2) Life on the Sea; (3) Character; (4) Newspapers; (5) Morning; (6) Summer; (7) Colonisation; and send up one for criticism.

5. *English Language and Literature.*—The parsing and analysis is very important in this paper. Remember to state relations of sentences fully, and to parse fully. In the example, 'This is the malt that lay in the house that Jack built'; the middle clause is subordinate to No. 1, adjectival to 'malt,' and principal No. 3. The ordinary Grammar should want little more than revision, the greater part of the time being devoted to derivation and Literature.

For this month :—

(1) Revise noun fully.

(2) Learn 20 roots each week from some good list. A good derivative dictionary should, when reading, always be at hand, and any new word looked out.

(3) A general sketch of the language, and the various dialects, etc., of which it is the result.

(4) Anglo-Saxon literature to 1066. Note the style, alliteration, the subjects, the chief writers and their works.

6. *Arithmetic.*—There is very little advance, if any, on the Third Year P.T. Examination. A somewhat more extended knowledge of the principles and theory is expected. All girls should, if they have anyone to give them a helping hand, attempt the alternative Algebra. Great attention must be paid to the method and arrangement of sums worked.

For this month, read the theory of G.C.M. and L.C.M., and work any problems on this. Note especially G.C.M. and L.C.M. of fractions. Next month a complete test paper will be set.

7. *Algebra.*—The tests in this subject are somewhat increasing in difficulty, and demand a very exhaustive knowledge of the limited amount set. *Factors* must be thoroughly known. For this month look up the chapter in Hall and Knight dealing with these, and work the general example given on them.

8. *Euclid.*—Book II. Props. 1–4, and four deductions each week.

9. *Geography.*—This subject usually presents considerable difficulty to candidates, especially to girls, mainly on account of faulty methods used during apprenticeship. Theoretically, after passing the last P. T. Examination there should be nothing to do, but unfortunately this is not often the case. The large number of facts to be committed to memory may best be learnt by inserting them in maps. With every country and every part of its geography a new outline should be drawn, and those facts only inserted which are to be remembered. In addition to the ordinary text book much valuable information may be obtained from general books of travel and exploration, from pamphlets issued by the various Colonial agents and shipping companies, while for most recent statistics Whitaker's Almanac should be consulted. The memory maps should be learnt early in the year and practised assiduously.

Work for this month :

1. Possessions in Europe and Asia (excluding India).
2. Revision of France and Germany.
3. Memory map of England.

10. *History.*—Use notebook freely. Prepare plans of important battles, provisions of all important statutes, trace cause and effect in all movements, and read as widely as possible.

Work for this month :

William to Stephen. Norman rule in England.

Chief points :

The changes brought about by the Conquest.
The perfection of the Feudal system.
The Investiture dispute.
The Civil War : its causes and effects.
The Administrative system.
(*a*) The Great Council.
(*b*) The Curia Regis.

11. *Teaching.*—The lessons to be given before H.M.I. should be selected and prepared early. Notes of Lessons should be written each week; the subjects are usually supplied by the school curriculum, but additional subjects will be given in these columns.

12. *Teaching Theory.*—Chap. I., 'Scholarship School Management.'

13. *Needlework.*—Students are referred to excellent notes which will be found from time to time in another column of this Journal.

14. *Domestic Economy.*—Work for this month :—Food and its functions. Classification of food stuffs.

15. *Music.*—All students should score full marks in this easy subject. There are many reliable books. Those taking Tonic Sol Fa should obtain the 'School Teachers' Music' (Curwen) and endeavour to get their certificate during the year.

16. *French.*—Prepare Chap. I. of 'Le Philosophe sous le Toits.' A juxtalinear translation will shortly be issued from the office of the PRACTICAL TEACHER, which each student will find most useful.

In French grammar prepare the Noun—Gender—pay special attention to exceptions. Practise also turning the English translation of the author back into French regularly.

In addition to the foregoing subjects every student should endeavour to pass the Science (Elementary Physiography) Examination in May and to obtain a first class in Freehand either at the May exams. or at the School exam. For the Science, Gregory's Elementary (Nelson & Son) should be used; and for the drawing, Bridge's Freehand, 2nd Grade (1s. per packet), and Historical Ornament (Chapman & Hall, in two books 3d. each) will be found very serviceable.

Additional Books.

'Reign of Queen Anne' (Geo. Philip & Son).
'Reign of Queen Anne' (Ralph & Co.).

A very useful little book, well suited for scholarship students.

Messrs. Philip & Son also publish a splendid shilling atlas of the Colonies, and a very useful little work on the Colonies and their industries.

The Reign of Queen Anne is also covered by one of the sections of Green's History, published by Macmillan.

Lamb's Tales from Shakespeare (W. & R. Chambers) might well be used as a general render.

RULES AS USUAL.

ANSWERS TO CORRESPONDENTS.

L.J.P.—A very good essay. ⅝8. General writing should be much improved.

Puzzled.—The following is the arrangement of sentences :—

1. Thou stay thy cloudy ebon chair. (Principal.)
2. Wherein thou ridest with Hecate. (Adj. to 'chair' in No. 1).
3. And thou befriend us—thy vowed priests. (Principal.)
4. Till utmost end of all thy dues be done. (Adverb : to 'befriend.')
5. Till none be left out. (Adverb : to 'befriend.')
6. Ere the blabbing Eastern Scout (the nice morn on Indian steep) peep from the cabined loop-hole. (Adv. to 'befriend.')
7. Till she descry to the sun our concealed solemnity. (Adverb : to 'befriend.')

H.L.F.—Send it up by all means. Criticism should never be shirked.

A.R.—Prepare Three Notes of Lessons, one on 3 R's, one on Class Subjects, and one on an Object.

S.P.J.—Will endeavour to include it next month.

All other Correspondents answered by post.

OUR 1898 CERTIFICATE CLASS.

BY J. C. HOROBIN, M.A.,
Principal, Cavendish College, Cambridge.

The Examination for Certificates will commence on Monday, 11th July 1898, at 2 p.m.

The general conditions for candidates are to be found in Articles 55–64 and 116–121 of the current Code.

QUESTIONS FOR TESTS.

FIRST YEAR.

Penmanship.

1. Write in large hand 'Parallelogram,' and in small hand:

'Witchcraft celebrates
Pale Hecate's offering.'

2. Dictation :—

Already for fifteen days the two armies, | alike protected by impregnable fortifications, | had been face to face, | without venturing anything | more than trifling forays and unimportant skirmishes. | On both sides | infectious diseases had diminished the forces | more than the sword of the enemy: | the natural consequence of the wretched food | and the closely packed multitudes. | At last the long-expected reinforcements appeared | in the Swedish camp. | and the considerable superiority of the king | now permitted him to act in accordance | with his natural courage, | and to break the fetters which hitherto had held him bound. |

School Management.

1. (*a*) Name some of the commonest faults of young assistants in teaching *spelling*. (*b*) How much of a spelling exercise should be oral, and how much should be written?

2. What are the best expedients you know for reviving the attention of a languid or disorderly class?

Composition.

Write a brief essay on :—

(*a*) 'As civilization advances, poetry almost necessarily declines.'—Macaulay, 'Essay on Milton.'

(*b*) The character of Hamlet.

(*c*) The influence of example on conduct.

Arithmetic.

A.—SOLUTIONS TO JANUARY EXAMPLES.

3. Since $\frac{5}{6}$ would introduce a fraction of a farthing, it will be better to find separately the cost of 1,587 cwt. and of $\frac{3}{6}$ of a cwt., and then add.

	£	s.	d.		
	1,587	0	0	= value at £1 each.	
10s. = $\frac{1}{2}$ of £1.	793	10	0	= ,,	10s. ,,
1s. = $\frac{1}{10}$ of 10s.	79	7	0	= ,,	1s. ,,
6d. = $\frac{1}{2}$ of 1s.	39	13	6	= ,,	6d. ,,
3d. = $\frac{1}{2}$ of 6d.	19	16	9	= ,,	3d. ,,
¼d. = $\frac{1}{12}$ of 3d.	1	13	$0\frac{3}{4}$	= ,,	¼d. ,,
	£934	0	$3\frac{3}{4}$	= ,,	11s. $9\frac{3}{4}$d. each.
	6		$6\frac{17}{20}$	= $\frac{5}{6}$ of 11s. $9\frac{3}{4}$d. each.	
	£934	6	$10\frac{1}{5}$		

4. Here £120 has to be divided proportionally to the numbers 350, 290, and 160, that is, to the numbers 35, 29, and 16.

Divide £120 into 80 equal parts, that is, into (35 + 29 + 16) equal parts;

Then A's share = $\frac{35}{80}$ of £120 = £52 10s.
B's share = $\frac{29}{80}$ of £120 = £43 10s.
C's share = $\frac{16}{80}$ of £120 = £24.

5. $$14{\cdot}25 \text{ per cent. of } 5600 = \frac{14{\cdot}25}{100} \text{ of } 5600$$
$$= \frac{1425 \times 5600}{10{,}000}$$
$$= 4802.$$

6. Every £100 insured will cover the premium £3 6s. 8d. and the value of £96 13s. 4d. worth of goods.

Hence every £$96\frac{2}{3}$ worth of goods must be insured at £100, or £7,250 worth of goods at

$$£\frac{7250 \times 100}{96\frac{2}{3}} = £7500.$$

7. Here the gain = $\frac{12\frac{1}{2}}{100}$ of £1 10s.

$$= \frac{30\text{s.} \times 12\frac{1}{2}}{100} = 3\text{s. } 9\text{d.}$$

∴ Selling price = £1 10s. + 3s. 9d.
= £1 13s. 9d.

8. From March 12th, 1892, to December 29th, 1893 = 1 year 292 days = $1\frac{4}{5}$ years.

$$\therefore \text{Interest} = \frac{£850\frac{3}{8} \times 4 \times 1\frac{4}{5}}{100}$$
$$= £61\ 4\text{s. } 10\tfrac{4}{8}\text{d.}$$

NOTE.—The first of the days is not counted: from March 1st to March 2nd, for example, is *one* day. The British custom is to reckon 365 days to the year in questions of this kind.

9. Here £$3\frac{1}{3}$ is the income on £100;

$$\therefore £1 \text{ ,, ,, } \frac{£100}{3\frac{1}{3}};$$
$$\therefore £4 \text{ ,, ,, } \frac{£100 \times 4}{3\frac{1}{3}};$$
$$\therefore \text{Quotation} = \frac{100 \times 4}{3\frac{1}{3}} = 120.$$

NOTE.—The amount invested is of no account in questions of this type.

10. In 1 minute the first tap will fill $\frac{1}{3}$ of the bath;
,, ,, second ,, $\frac{1}{5}$,,
,, ,, third will empty $\frac{2}{15}$,,
∴ In one minute all three taps fill $(\frac{1}{3} + \frac{1}{5} - \frac{2}{15})$ of the bath;
∴ $\frac{8}{15}$ of the bath is filled in 1 minute;
∴ The whole bath will be filled in 1 min. $\div \frac{8}{15} = 2\frac{1}{8}$ min.

(B.)—FEBRUARY EXAMPLES.

1. Prove diagrammatically that $\frac{2}{3}$ of 1 is $\frac{1}{3}$ of 3.
2. Prove diagrammatically that $\frac{3}{4} + \frac{1}{2} = 1\frac{1}{4}$.
3. Divide £471 12s. 6d. into parts proportional to $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$.
4. Of what sum is $12\frac{1}{2}$ per cent. equal to 7s. 6d.?
5. In what time will the interest on £540 amount to £63 at $3\frac{1}{2}$ per cent.?
6. Find to the *nearest* penny the compound interest on £1,760 10s. for $2\frac{1}{2}$ years at 4 per cent.

Music.

1. Re-write the following, halving the value of each note and rest, (*i.e.*, write in one pulse what is here given in two pulses) :—

| m :d .r | m :- .f | s :— | — : ‖
| :f | m .r :d | d :t_1 | d :— ‖

2. Write a measure of each of the following kinds. Begin each measure with a strong accent. Do not fill in notes in the pulses :—

(*a*) Four-pulse; (*b*) Six-pulse; (*c*) Three-pulse; (*d*) Nine-pulse.

English.

1. Write an account of the German Element in English and the origin of the Classification of Verbs into Strong and Weak.

2. Analyse Sonnet 35, Wordsworth, and parse: Return, content, fondly, pursued, even, child, between, flying, whence, morning, keen, salt-sea, billows, multitude, have, tracked, shield, stains, minds, growing, out.

3. Write an account of the metrical structure of the Sonnet, and say what you know of other English Sonnet writers than Wordsworth.

Geography.

1. Give a detailed description of the industries, the form of government, and the system of education in France and Spain.

2. Describe the main trunk lines of the European Railway System.

History.

1. Take the following names, and say briefly what makes them noteworthy in English History:—Laud, Burke, Walpole, Hyde, Strafford.

2. Narrate the leading events in the reign of Henry IV.

SECOND YEAR.

Penmanship / *Spelling* } As First Year.

School Management.

1. Give some familiar examples of false induction; and say what kind of school exercises are best calculated to encourage the habit of making a true use of the inductive process.

2. Distinguish between Natural, Civil, and Moral Law; and give an account of what is known as the Laws of Association.

Composition, *Arithmetic*, *Music* } As First Year.

English.

1. Questions 2 and 3 of First Year.

2. Sketch the Character of Polonius, and briefly summarise 'Hamlet,' Act IV., from the 'deed' carried out by Claudius for the Prince's 'especial safety' to the funeral of Ophelia.

Geography, *History* } As First Year.

WOMEN ONLY.

First Year.

Needlework.

1. Cut out in paper and tack together back and front, upper-half, right-hand side of a woman's chemise (full size).

2. On the given piece of calico (9 ins. square), show, *completely finished*, the opening for front of same.

Domestic Economy.

1. Give a scheme of a week's cheap dinners for a working man's table, with a family of five persons.

2. How may (1) rice, (2) barley, (3) maize be used advantageously as food for invalids or children?

OR

Geometry.

1. Prove I. 25 and I. 4.

2. Give Axioms 3, 4, 6, and define Rhombus, Parallel lines, Right angle

Second Year.

Needlework.

1. and 2. As First Year.

Domestic Economy.

1. As First Year.

2. Distinguish between Life Policies and Annuities; and between Friendly and Building Societies.

OR

Geometry.

1. As First Year.

2. Prove Prop. I. 35, also I. 19.

Through a given point draw a straight line, making a given angle with a given straight line.

MEN ONLY.

First Year.

Algebra.

1. What is meant by the abbreviation 'an *infinite* geometrical progression'?

If S be the sum of the squares, and S′ the square of the sum, of the terms of an infinite geometrical progression, r being the common ratio; $S : S' :: 1 - r : 1 + r$.

2. Solve the equations:—

(1) $\begin{cases} 96x + 75y = 102. \\ 92x + 80y = 101. \end{cases}$

(2) $\begin{aligned} x^2 + xy &= 66. \\ x^2 - y^2 &= 11. \end{aligned}$

Geometry.

1. If two triangles have two angles of the one equal to two angles of the other, each to each, and one side equal to one side, namely, sides which are opposite to equal angles in each, then shall the other sides be equal, each to each; and also the third angle of the one equal to the third angle of the other. PM, PN are squares on the sides of the right-angled triangle QPR, and MH, NK are perpendiculars on the hypotenuse QR produced. Prove that QR and the triangle PQR are respectively equal to the sum of MH, NK, and of the triangles QMH, RNK.

2. If a side of any triangle be produced, the exterior angle is equal to the two interior and opposite angles; and the three interior angles of every triangle are equal to two right angles. If there be an isosceles and an equilateral triangle upon the same base, and so that the inner vertex is equally distant from the other vertex, and from the extremities of the base, then, according as that of the former is the inner or outer vertex, its base angle will be $\frac{1}{4}$ or $2\frac{1}{2}$ times the vertical.

Second Year.

Algebra.

1. As First Year.

2. The number of combinations of n things taken r at a time is the same as the number of them taken $n - r$ at a time.

The number of permutations of $2n + 1$ things, $n - 1$ together: the number of permutations of $2n - 1$ things, n together :: 3 : 5; determine n.

3. Assuming the law of formation of the terms to hold when $n - 1$ binomial factors are multiplied together, prove it to hold for n factors, and hence derive the Binomial Theorem.

Write down the general term of $\left(3ax - \frac{y}{3a}\right)^n$

Geometry.

1. As First Year.

2. If a straight line be divided into any two parts, the square on the whole line is equal to the squares on the two parts, together with twice the rectangle contained by these parts. If from one of the equal angles of an isosceles triangle a perpendicular be dropped on the opposite side, the square on that perpendicular is equal to the square on the line intercepted between it and the other equal angle, together with twice the rectangle contained by the segments of the side.

3. When is a straight line said to touch a circle? What is the distinction between the angle of a segment and the angle in a segment? If any two points be taken in the circumference of a circle, the straight line which joins them shall fall within the circle

SOME QUESTIONS IN THE THEORY OF TEACHING, AND NOTES THEREON.

1. What do you understand by the Intuitional System of Philosophy; and what objections do you recognise against it?

Intuitional Philosophy is based on two distinguishable ideas:

(1) Possession of inherent power of deciding right from wrong.

(2) Deduction from experience (Self and Racial) of general principles of conduct, to which are referred as standards particular acts.

Locke and others argued that the latter position followed necessarily from the relation of Creator and Rational Creature.

The objections follow two main lines of thought:

(1) Neither the physiological nor psychological processes have been delimitised.

(2) There is no general agreement among different races, nor at different times, on what shall be accepted as the standard general principles.

2. What are the tests of a general principle in intuitional philosophy?

(*a*) Must be universal in application.

(*b*) Must be necessary consequence of rationality.

(*c*) Must be axiomatic.

(*d*) Must be unquestionable, *i.e.*, it must be impossible to think the contrary true.

3. What do you understand by Education?

Education is a process of development either idealistic or technical.

It is both a science and an art, since certain general principles are recognisable, and there is a body of rules governing practice.

The child as the subject of education is analysable into body, mind, and character, hence any educational system pretending to completeness must have regard to physical, mental, and ethical development.

The essential difference between the first two and the last division of education is that whilst activity simply is the measure of the strength in the former, it is not so in the latter, the direction being: 'BE this; not *do* this'

4. Do 'actions,' as such, come within the scope of moral judgment?

No; for they are but the outcome of the co-ordination of nerve stimuli and muscular movement, which are no more moral or immoral than the response to the penny dropped in the slot of an automatic machine.

5. What do you understand by the statement 'Ethics is concerned with moral judgments?'

Things are not assessed morally; it is only such conduct as implies will or volition that comes within its scope.

The actions of infants, reflex states, and those of persons not in a rational condition cannot be assessed ethically.

There is an apparent exception in actions which have become habits by repetition, but not really so, for the critical processes and drill must have been voluntarily undergone, and therefore the resultant effect comes within the law.

6. What is the hedonistic view of morality, and what differences are there in its statement as a system of philosophy?

Baldly, pleasure is said to be the criterion of right and wrong. But there is the fundamental distinction whether it is the pleasure of the agent only (egoism) or of all within the sphere of action (altruism). The Cyrenaics only considered the sense pleasures, but the Epicureans included intellectual and social pleasures, whilst Christianity, considered as a system of philosophy, has made the general of equal importance with the particular.

Hobbes (1588–1679) is the boldest representative of egoistic hedonism, whilst Tolstoi is almost purely altruistic.

The view of Hobbes that the whole duty of man is to look after number one fits the savage and the child, but the altruistic view more nearly coincides with Christianity.

Kant comes between the two in assigning to reason a discriminating function, a view partially accepted by St. Paul.

SYLLABUS OF WORK FOR THE MONTH.

Students are advised not only to get up the work indicated, but also to use the test questions as indications of work to be got up and afterwards written out.

FIRST YEAR.

School Management.

1. Notes of Lessons, skeleton and full, criticism, use of B.B. in teaching.
2. Writing, stages of instruction, slope, use and abuse of copy-books, size, schemes for infant schools, classification of errors.
3. Spelling, methods of instruction and practice.
4. General principles of discipline.

Composition.

1. Winds and clouds.
2. Arbitration.
3. Account of life and works of the author from which you took your repetition.
4. Peace, and the effect of commerce in maintaining it, or the reverse.

Arithmetic.

Not less than six examples from miscellaneous sets ought to be worked per week, as well as on the particular work set and the examination questions given.

1. Pars. 221, 222, 225, P.
   Par. 376 and examples on it.
2. Pars. 227–235 inclusive, P.
   Par. 377 and examples on it.
3. Pars. 236–241 inclusive, P.
   Par. 379 and examples on it.
4. Pars. 243, 244, 248, 249, 250, P.
   Par. 381 and examples on it.

Music.

1. Measures and their pulse signs.
   Minor thirds of the scale.
2. Characteristics of tones.
   Keys, signatures and their signification.
3. Intervals and their inversions.
   Major thirds of the scale.
4. Strong, weak, and medium pulses.
   Minor seconds of the scale.

English.

1. Verbs—strong and weak and their points of distinction.
2. English—origin and relationships.
3. Verbs—auxiliary, uses and history.
4. Rules of punctuation—types of metre—German element in English.

Literature.

1. Lamb—'Quakers' Meeting.'
   Wordsworth—Sonnets 21–30.
2. Lamb—'Schoolmaster.'
   Wordsworth—'Beggar'—'Nutting.'
3. Lamb—'Sympathies.'
   Wordsworth—Sonnets 31–40.
4. Lamb—'Witches.'
   Wordsworth—'Joanna'—'Fir Grove Path.'

Geography.

1. States of Western Europe and their productions.
2. Rivers and Lakes of Europe.
3. Commercial interchange in Europe.
4. Railways of Europe.

History.

1. Richard II.
   Norman Conquest—Laud.
2. England after Peninsular and Waterloo Campaigns.
   Langton, Burke, Hyde.
3. Henry IV.
   Reformation—Hampden.
4. Canning Administration.
   Beckett, Walpole, Strafford.

MEN ONLY.

Algebra.

1. Par. 137, Smith, or the same elsewhere.
   Geometrical Progression.
2. Quadratic equations, definition, methods of solution.
   Harmonic Progression.
3. Irrational equations.
   Geometrical Progression (proof of rules).
4. Relation of roots and coefficients in Q.E.

Geometry.

1. Book I. 16–24.
   ,, II. 1 and 7.
   ,, III. 9–12.
2. ,, I. Axioms. Props. 25–35.
   ,, II. 2 and 9.
   ,, III. Definitions. Props. 13–16.
3. ,, I. ,, ,, 36–39.
   ,, II. 3 and 10.
   ,, III. 17–20.
4. ,, I. Postulates. Props. 40–45.
   ,, II. 4 and 11.
   ,, III. Props. 21–26.

WOMEN ONLY.

Needlework.

Back and front, upper half, right-hand side of woman's chemise—all stitches used therein.

Domestic Economy.

1. Mastication and digestion.
2. Air—water.
3. Housewifery.
4. Cost of materials for articles of clothing;

OR,

Euclid I. 25–27.
Revise axioms and Props. 4, 18.

SECOND YEAR.

Composition.
Music.
Arithmetic.
Geography.
} As First Year.

School Management.

1. First two weeks of First Year.
   Moral Law—Duty—Perception.
2. Fitch VII.
   Memory—development. Fallacies.
3. Second two weeks of First Year.
   Moral obligation—Virtue—Association.
4. Fitch III.
   Inductive reasoning.

English.

Wordsworth as First Year in each week.

1. 'Hamlet,' Act IV. Sc. 1–3.
2. 'M.N.D.,' ,, III., First half.
3. 'Hamlet,' ,, IV., Sc. 4–7.
4. 'M.N.D.,' ,, III., Second half.

MEN ONLY.

Algebra.

As First Year in each week.

1. Permutations.
2. Binomial Theorem.
3. Permutations.
4. Binomial Theorem.

Geometry.

As First Year in each week.

1. Book IV. Defs. and 1.
   ,, VI. Prop. 11.
2. ,, IV. ,, 2–3. Defs. Bk. V.
   ,, VI. ,, 12.
3. ,, IV. ,, 4. Defs. Bk. V.
   ,, VI. ,, 13.
4. ,, IV. ,, 5. Defs. Bk. V.
   ,, VI. ,, 14.

WOMEN ONLY.

Needlework.

As First Year.
Also stroking and setting-in, with fixing different kinds of buttons.

Domestic Economy.

As First Year for each week.

1. Investments.
2. First Aid.
3. Investments.
4. Poisons and their treatment.

OR,

Euclid as First Year.
Also Props. 38–40 and riders thereon.

OUR SCIENCE SECTION

PHYSIOGRAPHY NOTES.

Note on a Theory of Sun-spots.—At a meeting of the Royal Dublin Society on December 22, Prof. J. Joly, F.R.S., put forward the following theory as to the formation of sun-spots. If at some level in the photosphere the temperature falls below the critical temperature of the elements present (when sufficient pressure is able to liquefy a gas), and the pressure is sufficient, a precipitation of liquid will result; and it is suggested such a precipitated flood of liquid matter, supported on gaseous matter of higher density, would give rise to the appearance presented by a sun-spot. If the liquid is opaque it will look darker than the surrounding photosphere. The reflection of the photosphere at the edge and the inrush of gaseous matter over the cooler area, will, it is believed, explain the appearance of the penumbra. The re-evaporation of the liquid constitutes the disappearance of the spot. On this view the sun-spot constitutes the first beginning of a change of state in the sun visible to us.

The Original Crust of the Earth.—Do the crystalline gneisses represent portions of the original earth's crust? is the question asked and answered in the affirmative by Mr. J. Lomas in his recent presidential address to the Liverpool Geological Society, and published in the December *Geological Magazine*. Excluding gneisses of later igneous or metamorphic origin, there remain the great series of fundamental gneisses, world-wide in distribution and uniform in general character, which must have had some world-wide cause of origin. As a possible cause of their foliation, Mr. Lomas suggests tidal action in the incompletely consolidated crust. Prof. E. H. Darwin has shown that huge tidal wrinkles must have been raised by the moon when near the earth, forming ridges and troughs which ran north and south near the Equator, and curved to the eastward as they approached the Poles. The strike of the gneisses of Britain and Scandinavia corresponds to the direction of these tidal wrinkles in those latitudes, and there is evidence that palæozoic strata were deposited in troughs parallel to the gneissic ridges. In Anglesey, according to Mr. Lomas, we have a portion of one such ridge that may never have been submerged under the sea.

The Wettest Spot in the British Islands.—On December 15, Mr. W. Marriott read a paper on the rainfall of Seathwaite, Cumberland, before the Royal Meteorological Society. This place has long been noted for its heavy rainfall, the average amount being **137 inches.** The spring months of April, May, and June are the driest, as they have not only the least rainfall but also the least number of rainy days. The heavy nature of the rainfall may be gathered from the fact that 21 per cent. of the falls are above one inch, 2 per cent. being above three inches. The greatest fall on one day was 8·03 inches, on November 12. The author has investigated the atmospheric conditions under which the heavy rainfall occurred at Seathwaite, and he finds that these heavy falls are due to the direction and force of the wind. When the wind is blowing strongly from the south-east or south-west, it will be concentrated in the valleys on the windward of Scafell, and rush up them with great force, the air current being consequently projected to a considerable altitude above Scafell. Owing to the reduction of temperature with elevation, the air parts with a great deal of its moisture, which falls as rain. With such a process going on continually for a whole day the heavy rainfall of Seathwaite is fully accounted for.

Icebergs in the Southern Ocean.—Mr. H. C. Russell, C.M.G., F.R.S., read a paper before the Royal Society in continuation of one on the same subject read on September 4th, 1895. It deals with the report of icebergs seen since the end of July 1895. One hundred and two ships have reported ice in the interval: nearly the whole of the ice, as reported, was within the area inclosed between 40° and 86° E. longitude and 40° to 62° south latitude; very few reports of ice outside that area have been received. It was shown that the 'Thermopylæ' steamed for 1,000 miles amongst icebergs, and that the ocean was clear one hundred to one hundred and twenty miles north of this track. Some idea of the number of icebergs may be gathered from the fact that the officers of one ship counted 977 bergs, and those of another ship 4,500. This and the previous paper cover a period of six years, and it was shown that the icebergs come into or leave the track of vessels in a few days. Three instances in which there had been sudden disappearances were shown to be coincident in point of time with the advent in Australia and the ocean between the Cape and Australia of strong north to north-west winds.

Kite Meteorology (from *Nature*).—The systematic exploration of the upper air by means of kites is referred to by Prof. Cleveland Abbe in the *Monthly Weather Review*, at the end of a long article upon the experiments made previous to 1893. It is pointed out that at that time the Malay kite and the free balloon were looked upon as merely the means for occasionally obtaining isolated items of information from the upper regions. The world had not then awakened to the possibility of the work inaugurated by Prof. Moore in July 1895, which looks to the compilation of a daily map of simultaneous observations high above the earth's surface and over a large portion of the United States, for study in connection with the map of surface conditions. Observations of the air at a single station can have but little value compared with the international balloon work of Europe or the extended national kite work of the United States Weather Bureau.

In an address at Toronto before the British Association, Prof. Moore said: 'For 27 years the forecasters of the Weather Bureau have studied the inception, development, and progression of these different classes of atmospheric disturbances. From a knowledge gained by many years' service as an official forecaster, I do not hesitate to express the opinion that we have long since reached the highest degree of accuracy in the making of forecasts possible to be obtained with surface readings. It is patent that we are extremely ignorant of the mechanics of the storm; of the operations of those vast yet subtle forces in free air which give inception to the disturbance, and which supply the energy necessary to continue the same. Long having realised this, I determined at once, on coming to the control of the United States Weather Bureau, to systematically attack the problem of upper air exploration, with the hope of being able ultimately to construct a daily synoptic weather chart from simultaneous readings taken in free air at an altitude of not less than one mile above the earth. It appeared to me that all previous plans for investigating the upper air, by means of free and uncontrollable balloons, or by isolated kite stations or mountain observatories, were of little value in getting the information absolutely necessary to the improvement of our methods of forecasting. Simultaneous observations at a uniform high level from many co-operating kite stations was the fundamental feature of the plan that I inaugurated for the prosecution of this important investigation.

'Prof. Marvin was assigned to the difficult task of devising appliances and making instruments, and I am pleased to say that we have improved upon kite flying to such an extent that apparatus is easily now sent up to a height of one mile in only a moderate wind. We have made an automatic instrument that, while weighing less than two pounds, will record temperature, pressure, humidity, and wind velocity. By January next we expect to have placed not less than twenty stations between the Rocky Mountains and the Atlantic Ocean, taking daily readings at an elevation of one mile or more.

'We shall then construct a chart from the high level readings obtained at these twenty stations, and study the same in connection with the surface chart made at the same moment. As we shall thus be able to map out not only, as now, the horizontal gradients for the lower surface conditions, but in addition the simultaneous gradients for the upper level, and, what is still of more importance, shall be able to deduce from these, for any section of the atmosphere, the simultaneous vertical gradients of temperature, humidity, pressure, and wind velocity, we may confidently hope to better understand the development of storms and cold waves, and eventually improve the forecasts of their future course, extent, and rate of movement. It will be a fascinating study to note the progress of cold waves at the upper and lower levels, and to determine whether the changes in temperature do not first begin above. I am anxious to know the difference in temperature between the surface and the upper stratum in the four quadrants of the cyclone, and also of the anticyclone, especially when the storm or cold wave conditions are intense. The vertical distribution of temperature in the several quadrants may give a clue to the future direction of movement of the disturbance.'

MATHEMATICS.

STAGES 2 AND 3, SCIENCE AND ART DEPARTMENT.

BY G. A. BAXANDALL,

Mathematical Division, Royal College of Science, London, and Lecturer on Theoretical Mechanics, City of London College.

STAGE 2.

Algebra.

Error in December Number.—Please notice in the line preceding the two italicised statements in the Algebra section, half-way down p. 327, that 'coefficient of x' should read 'coefficient of x^2.'

Simultaneous Equations.—In solving such equations be quite sure that you can employ the *method of substitution*. For example, solve the equations $x - 3y = 6$, $2x^2 - 3y^2 = 159$. From the first we can put $x = 6 + 3y$, and *substituting* this into the second we have a quadratic for y only, namely, $2(6 + 3y)^2 - 3y^2 = 159$, or $5y^2 + 24y - 20 = 0$. From this find y, and then, by putting its values in the first equation, find the values of x. If you have $xy = 6$, then $x = \frac{6}{y}$.

Observe that you may employ this method in each of the following cases :—

$$\left.\begin{matrix} x + y = 8 \\ (2x - 3y)(3x - 2y) = 9 \end{matrix}\right\} \qquad \left.\begin{matrix} 5x - 3y = x + y + 20 \\ x^2 + y^2 = 11x - 5y \end{matrix}\right\}$$

$$\left.\begin{matrix} x + y = 40 \\ xy = 300 \end{matrix}\right\} \qquad \left.\begin{matrix} x^2 + y^2 = 225 \\ xy = 108 \end{matrix}\right\} \qquad \left.\begin{matrix} 3x + 2y = 16 \\ xy = 10 \end{matrix}\right\}$$

$$\left.\begin{matrix} x^3 + y^3 = 407 \\ x + y = 11 \end{matrix}\right\} \qquad \left.\begin{matrix} \frac{y}{x} + \frac{x}{y} = 2\frac{1}{2} \\ x + y = 6. \end{matrix}\right\}$$

Try the above by the method of substitution, even though you know how to solve some of them by other methods. The answers are :—

(1) 3, 5 ; 5, 3. (2) 3, −5 ; 8, 0. (3) 30, 10 ; 10, 30. (4) $\pm 9, \pm 12$; $\pm 12, \pm 9$. (5) $2, \frac{1}{3}$; 5, 3. (6) 7, 4 ; 4, 7. (7) 4, 2 ; 2, 4.

Surds.—The square root of 4, which we express as $\sqrt{4}$, is *exactly* 2 or −2. You could not find the *exact* value of the square root of 3 by the ordinary arithmetical process ; you may get the answer to 10, 100, or 1,000 decimal places, but you cannot find the *exact* answer ; we therefore say that the square root of 3 is a *surd*, and we leave it as $\sqrt{3}$. Practise raising such a number as $\sqrt{3}$ to any power, the 2nd, 3rd, 5th, 8th, etc. Similarly, $2 + \sqrt{3}$, $\sqrt{5} - \sqrt{7}$ are *surd* expressions. Observe that $(2 + \sqrt{3})(2 - \sqrt{3})$ and $(\sqrt{5} - \sqrt{7})(\sqrt{5} + \sqrt{7})$ are *not* surds, for we get $2 - 3$, *i.e.* -1, and $5 - 7$, *i.e.* -2. Now please become familiar with this operation. Select any surd you like (do this a dozen times), say $\sqrt{41} - 6$, and multiply it by what is termed the complementary surd, namely, $\sqrt{41} + 6$, the result is *not* a *surd*, but an ordinary *rational* number. Why do we, when we see a fraction like this,

$$\frac{2 + 5\sqrt{3}}{\sqrt{7} - \sqrt{5}},$$

multiply numerator and denominator by $\sqrt{7} + \sqrt{5}$, thus

$$\frac{2 + 5\sqrt{3}}{\sqrt{7} - \sqrt{5}} \times \frac{\sqrt{7} + \sqrt{5}}{\sqrt{7} + \sqrt{5}} ?$$

The answer is, because the denominator is now a rational number ; for we get

$$\frac{(2 + 5\sqrt{3})(\sqrt{7} - \sqrt{5})}{2}$$

Be ready, therefore, whenever you see a surd to multiply it by the complementary surd, especially if it occur in the denominator.

Work the following :—

Divide $3\sqrt{5} + 2\sqrt{3}$ by $4\sqrt{3} - 3\sqrt{5}$. Ans. $23 + 6\sqrt{15}$.

Find the value of $\frac{\sqrt{2}}{\sqrt{3} - \sqrt{2}}$, correct to 4 places of decimals.

Do this by rationalizing the denominator, and also by working out the numerator and denominator as decimals, and dividing one by the other. Observe that the second method takes you a longer time. Ans. 4·4494.

Simplify—

$$\frac{2\sqrt{3} + 4}{2\sqrt{5} - 3\sqrt{2}} ; \left(\frac{5 + 2\sqrt{3}}{4 - \sqrt{3}}\right)^2 \times \left(\frac{2 - \sqrt{3}}{\sqrt{3} + 1}\right)^2 ;$$

$$\frac{1}{2}\frac{\sqrt{2} + 1}{\sqrt{2} - 1} + \frac{1}{3}\frac{\sqrt{2} - 1}{\sqrt{2} + 1} ; a. \frac{\sqrt{x + a} - \sqrt{x - a}}{\sqrt{x + a} + \sqrt{x - a}}.$$

Ans. (1) $2\sqrt{15} + 4\sqrt{5} + 3\sqrt{6} + 6\sqrt{2}$;

(2) $\frac{1}{2}(2 - \sqrt{3})$; $\frac{15 + 2\sqrt{2}}{6}$; $x - \sqrt{x^2 - a^2}$.

Solve the equations—

(1) $\frac{\sqrt{12x + 1} + \sqrt{12x}}{\sqrt{12x + 1} - \sqrt{12x}} = 18.$ Ans. $\frac{289}{864}$.

(2) $\frac{5x - 1}{\sqrt{5x + 1}} = 1 + \frac{\sqrt{5} - 1}{2}.$ Ans. $\frac{9}{5}$.

Simplify—

$$\frac{2a\sqrt{1 + x^2}}{x + \sqrt{1 + x^2}},$$

and then find its value when

$$x = \frac{1}{2}\left(\sqrt{\frac{a}{b}} - \sqrt{\frac{b}{a}}\right).$$ Ans. $a + b$.

STAGE 3.

Algebra.

Permutations and Combinations.—To work out exercises successfully on this part of the subject requires very considerable practice. We shall merely indicate a few points which must be carefully considered.

1. Understand what is the difference between a combination, group, or selection, and a permutation or arrangement.

2. Know, and be able to prove the formulæ for the number of permutations or combinations of n different things taken r at a time, and as a special case, the formula for the number of permutations of n different things taken n at a time.

Exercises in which n and r are explicitly stated require only that these values be substituted in the formulæ ; but for other exercises one must rely on the principle stated in Hall and Knight, Art. 140, therefore

3. Think well over this Article, and try to realise that it is fundamental, that it is at the basis of all the formulæ on the subject, and that it may be directly applied to all exercises. In working examples, acquire the habit of stating in your own words what the 'operations' are which are referred to in the statement of this principle.

4. Know, and be able to prove the formulæ for the number of permutations and combinations for n things *not all different*, taken all at a time in the case of permutations, or taken some particular number, say 4, at a time in the case of either permutations or combinations.

5. Read over very carefully any exercises which are fully worked out in your text-book.

Work the following examples :—

(1) In how many different ways could 2 gentlemen be accommodated with a room each if there are 10 rooms ? Ans. 90.

(2) If 3 persons enter a room where there are 7 vacant seats, in how many ways can they sit down ? Ans. 210.

(3) In how many ways can 4 coins selected out of 20 coins be placed in a row ? Ans. 116,280.

(4) How many numbers between 2,000 and 3,000 can be formed by using the figures of the number 123,456 each not more than once ? Ans. 60.

(5) There are 10 candidates for 3 vacancies, and an elector can vote for any number of candidates not greater than the number of vacancies. In how many ways is it possible to vote if he always gives three votes ? Ans. 220.

(6) How many triangles can be formed when each side has to be either 10, 11, or 12 feet long ? Ans. 10.

(7) Prove that $\lfloor 10 = 2^8 . \lfloor 5 . 1 . 3 . 5 . 7 . 9$; and that

$$\frac{n(n + 1)(n + 2) \ldots (2n - 2)}{\lfloor n - 1} = \frac{\lfloor 2n - 2}{\{\lfloor n - 1\}^2}$$

Refer to Query Column, December 1897, p. 313, and observe the rule for summing certain series given in the solution of the query headed *A. Lendesay.*

Apply this to find the sum of n terms of the following series :—

(1) $5 + 9 + 13 + 17 + \ldots$.

(2) $1^2 + 2^2 + 3^2 + \ldots$.

(3) $1^3 + 2^3 + 3^3 + \ldots$.

(4) $1.2 + 2.3 + 3.4 + \ldots$.

(5) $4 + 14 + 30 + 52 + 80 + 114 + \ldots$.

Ans.—(1), $n(2n + 3)$; (2), $\frac{1}{6}n(n + 1)(2n + 1)$; (3) $\left\{\frac{n(n + 1)}{2}\right\}^2$; (4) $\frac{1}{3}n(n + 1)(n + 2)$; (5) $n . (n + 1)^2$.

It may be observed that the above rule does not apply to geometrical series.

Our Science Section next month will contain Notes on Physiology, Chemistry, Heat, Magnetism, Electricity, and the first of a series of short papers on Differential Calculus for Beginners.

NOTES ON THEORETICAL MECHANICS.

BY F. CASTLE, M.I.M.E.,

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ADVANCED AND HONOURS STAGES.

(*Continued from page* 388.)

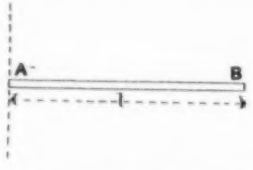
Moment of Inertia.—The moment of inertia is so important, and is required so often in 'Mechanics,' that its consideration is of the utmost importance. The student is advised to work out as many problems as possible, until proficiency is gained in its use.

The moment of inertia of a system of particles about a point, line, or plane, is the sum of the products obtained by multiplying the mass of each particle by the square of its perpendicular distance from the given point, line, or plane. Thus a number of particles of masses m_1, m_2, m_3 . . . . the perpendicular distances from the given point, line, or plane being r_1, r_2, r_3 . . . . Then the sum of $m_1r_1^2 + m_2r^2 + m_3r^3 +$ . . . . ., which may be written Σmr^2, is the moment of inertia about the given point, line, or plane.

If we conceive a body to be made up of an infinite number of material particles or elements, and if the mass of each particle be multiplied by the square of its perpendicular distance from any line (or axis), the sum of all the products so formed, or Σmr^2, is called the moment of inertia of the body about the axis. In many cases the area instead of the mass of each element is used, then *the moment of inertia of the area* of a plane figure (such as a circle or a rectangle) is obtained.

Product of Inertia.—If r_1 and r_2 denote the distances of a particle from two planes (which may be at any angle, but are usually at right angles, to each other), then expressions of the form Σmr_1r_2 are called the product of inertia.

When the form and dimensions of a body are known, the sum Σmr^2 can be found. In a few of the simpler cases it may be found by algebraic methods, but these, and also the more difficult cases, are far more easily obtained by the process of integration. Even the student who is not familiar with the integral calculus can, with a little practice, apply the methods with certainty to the majority of cases with which he has to deal. The results obtained can be verified by experiment. In the case of irregular bodies, when the methods of the calculus fail, it becomes necessary to determine the moment of inertia by experimental methods.



Let I denote the moment of inertia of a rod AB about a line or axis, perpendicular to its length, and passing through one end A.

If we assume the rod to be divided into a large number of parts n, and denoting the mass of the rod by M, the mass of each particle will be $\frac{M}{n}$, and their distances from the axis will be

$$\frac{l}{n}, \frac{2l}{n}, \frac{3l}{n} \quad . \quad . \quad . \quad .$$

where l denotes the length of the rod.

$$\therefore I = \frac{M}{n}\left\{\left(\frac{l}{n}\right)^2 + \left(\frac{2l}{n}\right)^2 + \left(\frac{3l}{n}\right)^2 + \quad . \quad . \quad . \left(\frac{nl}{n}\right)^2\right\}$$

$$\therefore I = \frac{Ml^2}{n^3}(1^2 + 2^2 + 3^2 + \quad . \quad . \quad . \quad . \quad n^2) \quad (1)$$

The sum of

$$(1^2 + 2^2 + 3^2 + \quad . \quad . \quad . \quad . \quad n^3) = \frac{n}{6}(n+1)(2n+1)$$

$$\text{also } \frac{n}{6}(n+1)(2n+1) = \frac{2n^3}{6}\left(1 + \frac{1}{n}\right)\left(1 + \frac{1}{2n}\right)$$

Hence, substituting in (1) we obtain—

$$I = \frac{Ml^2}{3}\left(1 + \frac{1}{n}\right)\left(1 + \frac{1}{2n}\right).$$

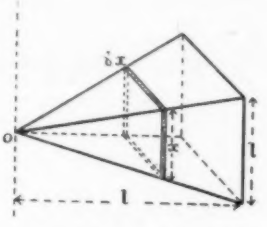
As n is a very large number, the quantities

$$\frac{1}{n} \text{ and } \frac{1}{2n}$$

are exceedingly small, and if n be assumed to be indefinitely great, or infinite, they become zero; when this occurs, instead of a number of isolated particles we have a continuous line of particles, or the rod.

$$\therefore I = \frac{Ml^2}{3}.$$

To illustrate the method of summation we may proceed as follows: As before, let l denote the length of the rod and m the mass of unit length. Assuming the rod divided into an indefinite number of equal parts, then, if we consider a particle at a distance x from the axis, the distance to the next would be either $x + \delta x$ or $x - \delta x$. (The symbol δx does *not* mean the product of a quantity δ into x, but is a convenient way of denoting that the δx is exceedingly small.)



The mass of a length $\delta x = m\delta x$. Hence moment of inertia of element $= m\delta x \times x^2$.

This may be shown graphically by a square of side x and thickness δx; and the moment of inertia of the rod by a series of indefinitely thin slabs or squares; the thickness of each δx, and the edges of the square having all the values respectively from $x = 0$ to $x = l$. In this manner a pyramid would be formed, having the edge at the base and also length of axis equal to l.

The volume of a pyramid $= \frac{1}{3}$ (area of base) (length of axis)

$$= \frac{1}{3}(ml^2) \times l = \frac{ml^3}{3},$$

but total mass of rod $= ml$.

Hence $I = \frac{1}{3}Ml^2$.

Applying the calculus (which simplifies the work), adopting the same notation as before. Imagine the rod to be divided into a very large number of equal elements, find the moment of inertia of each element, obtain the sum, and find its value when the number of elements becomes infinite; the distance between any two consecutive elements will then be infinitely small, and is represented by dx.

The moment of inertia of an element at a distance x from the axis is its mass into the square of its distance from the axis, or $mdx \times x^2$.

In order to include all the elements, the quantity x must be considered to grow from zero up to l, in other words, from the axis where $x = 0$ to the end of the rod where $x = l$.

$$\therefore \text{Moment of inertia of rod} = m\int_0^l x^2dx.$$

The summation indicated by

$$\int x^2dx, \text{ is } \frac{x^3}{3},$$

that is, *increase the index of x by unity and divide by the number so obtained, and also by the differential (dx) of the variable.*

A constant is usually added, as any constant added to or subtracted from an expression disappears during differentiation. Hence more strictly we should put

$$\frac{x^3}{3} + C.$$

The next step is to put in the *limits* 0 and l, or write l and 0 for x respectively and subtract the latter from the former.

$$\text{Thus } \int_0^l x^2dx = \frac{l^3}{3} - \frac{0}{3} = \frac{l^3}{3}.$$

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$$\therefore m\int_0^l x^2dx = \frac{ml^3}{3} = \frac{Ml^2}{3} \text{ since } ml = M.$$

The integration used is a particular case of a general form of integration which is often required, and is—

$$c\int_a^b x^n dx = \frac{c}{n+1}(b^{n+1} - a^{n+1}).$$

Thus the moment of inertia of a uniform rod about an axis passing through one end and perpendicular to its length is

$$\frac{(\text{mass}) \times (\text{length})^2}{3}.$$

The moment of inertia about an axis passing through its middle point, and perpendicular to its length, is found by writing $\frac{l}{2}$ for l in the above, and is $\frac{Ml^2}{12}$.

The quantity I can be written in the form Mk^2, where k is a length such that if the whole mass M were collected at the distance k from the axis its moment of inertia would not be altered. The length k so obtained is called the *radius of gyration*.

Thus, in a straight uniform rod about an axis through one end,

$$Mk^2 = \frac{Ml^2}{3}.$$

$$\therefore k = \frac{l}{\sqrt{3}} = \underline{.577 \text{ length}}.$$

About an axis through centre

$$Mk^2 = \frac{Ml^2}{12}.$$

$$\therefore k = \frac{l}{2\sqrt{3}} = \frac{l\sqrt{3}}{6} = .289l.$$

(*To be continued.*)

SCIENCE NOTES.

THE NEW READING ROOM AT THE IMPERIAL INSTITUTE.—A new commercial reading room at the Imperial Institute is now open for the free use of the public. Visitors can see there the chief British commercial and technical publications, and a number of Indian, foreign and colonial publications. There is also kept there a large collection of directories, almanacs, official year-books and handbooks, Government gazettes, diplomatic and foreign consular reports, market reports, prices current and statistics, trade circulars and catalogues, and an extensive collection of Indian and colonial maps. Inquiries relating to emigration, or commercial and industrial matters if addressed personally, or by letter, to the Commercial Intelligence Department, are promptly dealt with.

***

FLIES AND THE FERTILISATION OF SPRING FLOWERS.—In a recent number of the *Journal of Botany*, J. H. Burrill gives a list of the insect visitors observed on spring flowering plants on the Yorkshire coast. Short-tongued flies predominate in early spring, and visit freely flowers with honey, whether the honey is concealed or exposed. Some species apparently derive no advantage from their early flowering. *Capsella bursa pastoris*, for example, frequently has abortive stamens. *Ranunculus ficaria* rarely produces seed. *Ulex europæus* and *Primula vulgaris* set but little fruit. In other plants, *e.g.*, the hazel, where the flowers open before the leaves, pollination, whether by insects or the winds, easily takes place.

***

A NEW MYXOMYCETE.—A new parasite, *Pseudocommis vitis*, has recently been discovered by M. E. Roze in the hypodermal cells of the tubers and in the leaves of diseased potatoes. It is found in the form of plasmodes and of cysts, and attacks both the cell nucleus and the starch grains. It is often found, too, in garden and greenhouse plants, the black and brown spots well known to gardeners as indicating 'burning' showing the existence of this disease. Its rudimentary structure consisting of a plasmodic mucus, which becomes encysted in certain conditions, causes it often to be overlooked. While the plasmode is in a living condition, it is able to escape under favourable conditions and infest other vegetable tissues.

***

THE GROWTH OF PLANTS AND DARK HEAT RAYS.—Herr Nilsson has tested the effect on the growth of plants of the dark heat rays as compared with ordinary sunlight. He found by growing plants beneath a concentrated solution of alum that the epidermal cells are larger and their walls are more wavy, the outer and the radial walls being thinner. The amount of hairs is reduced, the palisade cells are shorter in the radial direction, and the intercellular spaces in the palisade tissues are larger. Different species showed different results with regard to the size of the leaves, the size of the stomates, and the absolute size of the spongy parenchyme.

***

FOOD-STUFFS AND THE RÖNTGEN RAYS.—The action of the X-rays on various salts and food-stuffs has recently been investigated by Thorner. He finds that, as a rule, organic bodies are readily penetrated by the rays, while inorganic substances are, as a rule, more resistant. Exceptions are found in the diamond, boric acid, borax, and lithium carbonate, all of which are very easily penetrated by the rays. Food-stuffs which have a low ash offer very little resistance to their passage. While flour, honey, and sugar are practically transparent, as soon as mineral matter is added to them, the mixture becomes much more resistant. Butter, mixed with salt, is distinctly more opaque than butter alone. The penetrability of bread to the X-rays, Thorner thinks, depends in a great measure on the porosity of the loaf, and, therefore, we may conclude a more transparent bread is likely to be more digestible. Wheaten-bread is more penetrable than that of rye, and brown bread is the least penetrable of all. The adulteration of coffee-berries may be readily detected by means of the X-rays; berries made of bread-crumbs are much more translucent, while berries that are made of clay or other inorganic matter are practically opaque. Tea-leaves that are faced with inorganic colouring matter give a much darker shadow than the natural leaves, while even bad hazel-nuts may be separated from good ones without cracking them by means of the Röntgen rays. Horn is more transparent than bone; celluloid is readily penetrated. The penetrability of bread, Thorner thinks, varies to a great extent with the porosity of the loaf, and a transparent bread is likely to be more digestible; paste offers more resistance to the Röntgen rays than real diamonds.

***

YEASTS AND INSECTS.—Dr. Amadeo Berlese has recently been investigating the close connection that exists between insects and yeasts. Inside a large glass jar, which was well closed and carefully sterilised, was hung a bunch of grapes, which had been washed and immersed in carbon disulphide and boiling water. This jar communicated by means of two long glass tubes, with a glass bottle on each side. The tubes and the bottles were carefully sterilised and connected by means of corks, so as to form with the jar a system into which air could only penetrate after filtering through sterilised cotton wool. Fourteen such combinations were prepared, into each of which non-sterilised substances were introduced in one of the sterilised side bottles, *e.g.*, soil, bark of trees, bark of vine poles, and of oak trees. In the second side bottle the same substances were introduced, after careful sterilisation. Slender vine branches were placed inside the long tubes to connect the grapes in the central jar with the substances in the side bottles, their object being to serve as sterilised paths along which the ants have to travel on their way from the infected material to the grapes. In ten experiments, in which ants were introduced, the infection of the grapes and sterilised material with yeasts and moulds was evident. When the ants came from a vineyard, and the non-sterilised material was ordinary soil or bark of vines, or of vine poles, the germs conveyed to the grapes and to the sterilised material were chiefly moulds, together with various species of *Saccharomyces*. Where the grapes were left in the apparatus some days after the ants were dead, moulds developed rapidly on the grapes and probably destroyed all the yeasts; for moulds were abundant in the test tube cultures, and no yeasts were observed. Other experiments of Dr. Berlese showed that various kinds of flies distribute yeasts. Small pieces of meat, which had been carefully sterilised by washing in sublimate solution and then in water, were exposed on a terrace, some inside a close wire net which prevented contact with insects, and others so as to favour the visits of flying insects only. After they had been exposed for two hours to the flies, and for thirteen hours to the air, the pieces of meat were dropped in to test tubes containing sterilised must, and the sediments obtained after fermentation examined for yeasts. He found that whenever the meat had been exposed to flies, yeasts were far more abundant than when the flies had been excluded. The quantity of yeasts carried to a piece of meat in a given time, Dr. Berlese considers, is about twenty-six times the amount that would be carried by air alone. He made flies too visit grapes that had been previously carefully sterilised, and they were found subsequently to be abundantly infected with a variety of yeasts and moulds.

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OUR COMPETITION PAGE

FRENCH AND GERMAN.

Prize Editor:

W. T. THOMPSON, B.A. (LOND.),
FRENCH AND GERMAN HONOURS.

RULES.

1. All translations should be posted not later than February 10, and addressed :—*Prize Editor*, Office of THE PRACTICAL TEACHER, 33, Paternoster Row, London, E.C.
2. Competitors should cut out, and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should adopt a pseudonym, and send name and address written on a separate piece of paper.
4. (*New Rule.*) No competitor may take the prize offered more than once in three months.

A Prize of One Guinea will be given for the best translation into English of the following extract :—

Il est dans la critique deux sortes de critiques : les critiques inférieurs et les critiques supérieurs à l'œuvre qu'ils jugent. Les premiers louent ou condamnent dans la mesure de leur capacité, de leurs lumières, de leurs forces, souvent dans l'innocence de leur conscience, parfois dans la rancune de leur jalousie. Les seconds, qui sont de beaucoup les plus nombreux, et qui font de la critique le genre littéraire qui compte peut-être en ce moment le plus de talents, attachés à un métier, presque toujours indigne d'eux, par le salaire fixe, la rémunération convenable, le seul gagne-pain littéraire assuré et menant à quelque chose de solide; les critiques supérieurs à l'œuvre qu'ils ont mission de recommander ou d'interdire au public ne se soucient guère, on le comprend, de suivre l'auteur pas à pas, de l'éplucher mot à mot, de faire enfin le rôle médiocre et ennuyeux d'un professeur de rhétorique corrigeant le thème d'un élève de sixième. L'amour propre des auteurs a beau ne point leur pardonner : il est très concevable que ces critiques sautent par-dessus le livre dont ils transcrivent le titre en tête de leur article, et qu'ils fassent sur ce titre, sur ce thème une improvisation et des variations personnelles : ils jouent le Carnaval de Venise, c'est leur manière de rendre compte ; et le public n'a pas longtemps la sottise de leur en vouloir. E. AND J. DE GONCOURT.

GERMAN COMPETITION.

In the hope of meeting the wishes of our readers we have decided to commence this month a competition in German. We therefore offer an additional prize of half-a-guinea for the best translation of the following extract :—

Es war Sylvesterabend. Das neue Jahr stand an der Schwelle des Lebens, während das alte sich müde und kraftlos in einen weissen Schneemantel hüllte und langsam in die Vergangenheit hinunterstieg, aus deren grauem Schooss nie eine Stunde wiedergegeben werden kann, Keinem zur Lust oder zur Qual.

Nur sehr gedankenlose Menschen nehmen mit gleichgiltiger Ruhe von dem scheidenden Jahre Abschied, etwa wie man ein Buch zuklappt, dessen Inhalt uns nicht sonderlich interessirte und auf dessen Fortsetzung wir nicht begierig sind. Die letzten stunden des Jahres haben eine Beredsamkeit, vor welcher der durchdringendste Verstand verstummt, eine Beredsamkeit, die ihren Weg in Herzen findet, denen sonst jede Rührung fern bleibt ; sie sprechen gleich überzeugend zu Glücklichen und Unglücklichen, jenen zurufend, was diesen noch zu hoffen blieb ; sie sind ein Spiegel, aus dessen Glas jede Thräne, jedes Lächeln unbarmherzig klar widerstrahlt, ein Band, mit dem das scheidende Jahr entfremdete Herzen aneinander schlingt, ein Schloss, welches die Lippen öffnet, das sie Unrecht sühnen, Hader schlichten und das süsse Geständniss der Liebe hervorstammeln können.

GEORG HARTWIG.

FRENCH COMPETITION.

RESULT OF THE DECEMBER COMPETITION.

The prize is awarded to '*Après fortune faite*,' the pseudonym of R. F. Forbes, Eaton House School, Aldeburgh, Suffolk.

First Class.—Echo, Bijou, Agaznog, C.E.M., Old Lamp, Cluny Brae, Clachnacudain, Clyde, Lac, Clio, P.C.Q., Red Leaf, Dies, Vesta, Châteauneuf, Antonia, Sinjunite, Titinius, Gargantua, Les yeux bleus, Nauta, Bloont, Maida Vale, Cherrie, Sir Bedivere, Laragh, Cui bono?, Friar Tuck, Bess, Pêcheur d'Islande, Nortoniensis, Sinjun, Treherbert, Polly, Pour le coup, L'abeille, Kenfig hill, Eldgytha, Christmas rose, Francc, Pelican, Caserta, Vincent, Zimbabwe, Ymgeisydd, Era, Bothwell, Tartarin, Dorothy Varden, Haddon Hall, Forward.

Second Class.—Excelsior, Zosime, Leumas, Primrose, Alifer, Narroc, Vivian, Susan, Nadia, Georgie, Teuton, Mab, Rosebud, Nelvil, Meisha, Ossian, Timaru, Perce-neige, Exonia, Beryl, The Zouave, Orcadia, SH_2, Langcliffe, Madge Wildfire, Legeolium, Vera, Wellingtonia, Indoctus, Amor vincit omnia.

Third Class.—Bertie, Dunelm, Coming, Bluebell, Guilford, White Broom.

Prize Translation.

Oh for the brush of a painter, of a master, that I might set before my dear readers—by way of frontispiece to this second narrative—the various positions which Tartarin of Tarascon's scarlet *chechia* assumed in the course of the three days' voyage from France to Algeria, on board the 'Zouave'!

First, I should show it on deck at starting—glorious, heroic, gleaming like a halo around that fine Tarascon head. Then I should depict it on leaving harbour, when the 'Zouave' began to dance among the waves; surprised, uneasy, with a presentiment of coming ill. My next view should be in the Gulf of Lions, as the boat neared the open, and the sea grew somewhat rough, when you would see it agitated, standing erect on the hero's head, at the mercy of the storm, its huge blue wool tassel bristling through fog and squall. Fourth position : six o'clock in the evening ; Corsica in sight. The unlucky *chechia* hangs over the quarter-netting, gazing wistfully on the sea as if to sound its depths. Fifth, and last position : at the further end of a narrow cabin, where, in a small bed, or rather drawer, something shapeless moans disconsolate as it rolls upon the pillow. It is the *chechia*, the brave *chechia* of the morning, now fulfilling the humble office of a nightcap, pulled down over the ears of a poor pallid wretch convulsed with sickness.

Ah, me ! could the good folk of Tarascon have seen their hero lying in that chest of drawers, a dull, wan light filtering through the portholes, all round him the stale odours of cooking and damp wood—the sickening smell of a steam-packet ; could they have heard him groan at each throb of the screw, asking for tea every five minutes, and swearing at the steward in a piping, baby voice, how bitterly they would have reproached themselves for persuading him to set forth ! APRÈS FORTUNE FAITE.

Our readers will notice that Miss Forbes has achieved the remarkable result of winning the prize two months in succession. While congratulating Miss Forbes on her well-deserved success, we think it advisable, in order not to discourage other competitors, to put a limit on the number of times a competitor may take a prize. We have therefore decided to add a new rule (No. 4), which will be found at the head of this page.

The results of the competition are very satisfactory. A large proportion of the papers are written in easy idiomatic English. Some few do not yet realise that what is expected of them is a translation into English, and not into the literal equivalents of French idioms in English words. As an example of what I mean, I may mention that several competitors translated *jurer contre le garçon* as 'swear *against* the steward,' instead of using the preposition which English idiom requires after the verb 'swear.' The successful competitor hardly used a strong enough expression in translating *obligé* by 'persuaded.'

A few competitors did not grasp the fact that 'Tartarin' is a proper name. Hence such translations as 'The Tartar of Tarascon,' 'the Tuscen Tartar,' 'the monkey of Tarascon (!!!).

A bord du 'Zouave' was rendered 'to the bank of the Zouave' and 'to the margin of the Zouave.'

Casque à mèche was a puzzle to some, who rendered it 'extinguisher,' evidently relying on the meaning 'wick' for *mèche*.

S'ils l'avaient entendu râler was translated 'If they had heard him rail' and 'if they had extended the railing.'

Si les Tarasconnais, etc., was rendered by an imaginative competitor 'If the Tuscans could have seen their big Tartar who fell from the port hole on that dull, sad day.'

Comme ils s'en seraient voulu was an idiom that puzzled several. Two odd translations were : 'They would have wished to have got out of his way,' and 'How they would have been glad of the excuse that they had an appointment elsewhere.'

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* * * * *

Ever since the love affair of Adam the world has yearned, with a twinkle in its eye, to know how the great ones of the earth woo and wed, how they marry and are given in marriage. This being so, the author of 'How to be Happy though Married,' has lighted on a very Golconda of a subject in his new book—'The Love Affairs of some Famous Men' [Fisher Unwin]. To do him justice, he is no collector of mere 'chatter about Shelley.' He does not, it is true, deal only with marital saints, but gives us a natural history of the 'husband' in all his phases. He offers his work as a contribution to the elucidation of the conditions which make for matrimonial bliss. I may say at once, for the behoof of potential husbands and wives, that the golden rule is as yet undiscovered. Our author, after a prolonged enquiry, is fain to answer the question 'Is married life worth living?' by the non-committal reply, 'It all depends on the livers.'

* * * * *

Should literary men marry? Though our author does not actually forbid the banns, his verdict, according to the evidence, is distinctly *not* favourable in the case of the poet. 'Shakespeare, Milton, Dante, Byron,' he remarks, 'are not easily surpassed as poets, but as husbands they did not amount to much.' *Prima facie*, the poet, 'soaring in high reason of his fancies with his garland and singing robes about him,' appears the very antithesis of the human, selfish, work-a-day, satisfactory husband. It is a far cry from Cloud Cuckoo Town to butchers' bills, washing days and the Queen's taxes. But you cannot generalise. It is nearer the truth to say that marriage with a poet is 'a game of double or quits.' There have been poets who have made ideal husbands. Wordsworth, Browning, Tennyson, to name only a few, have attained 'double firsts' in the matrimonial schools. Dear Tom Hood—as true a poet as ever breathed—was a prince of husbands. Here, for example, is the conclusion of one of this husband-lover's epistles to his wife: 'Bless you, bless you again and again, my dear one, my only one, my one as good as a thousand to your old Unitarian in love, T.H.' The mischief is that so many of the inspired seem to have been unable to resist the worship of a plurality of goddesses. Dante, Chaucer, Milton, Waller, Burns, Byron, Shelley each had a wife, and an Egeria or so into the bargain. The veriest tyro in matrimony knows that under these circumstances the little kingdom of home is apt to suffer something of 'the nature of an insurrection.'

* * * * *

But it has not always been the fault of the poet. Sometimes Mrs. Poet has despised the *magnum opus* of her husband, has called it 'stuff,' has lacked sympathy to appreciate his ideals, tenderness to humour his idiosyncrasies, tact to divert his moods, patience to suffer his vanities. Take Mrs. Landor as an example. In his honeymoon Landor read—and who could read more exquisitely?—his verses to his bride. 'All at once, the lady, releasing herself from his arm, jumped up, saying, 'Oh, do stop, Walter! There's that dear, delightful *Punch* performing in the street. I must look out of the window.' Mrs. Landor courted her doom. It is one of the rules of the game that the poet shall use his wife—or some other woman—as a 'foolometer.' Many women have gone to pieces in the effort to utter a perpetual note of admiration and disaster has followed. Still, as our author remarks, though poets learn in suffering what they teach in song, that is no reason why they should make their wives suffer also. The poet appears to be prone 'to hang up his fiddle behind the door, at home.' 'Do I interrupt you, Byron?' asked Lady Byron, coming into her husband's study. 'Damnably, madam,' was the poet's reply.

* * * * *

On the whole, the prose writers reach a very high level as husbands—a fact gratifying even to such a humble scribbler as myself. For one distinguished prose writer who has made a mess of matrimony you can find a dozen to disprove the old scholar's saying that 'Minerva and Venus cannot live together.' Steele, Richardson, Fielding, Scott, De Quincey, Grote, Thackeray, Richter, Balzac, Hawthorne, all made good husbands, though of course they had their faults. And yet, the wife of a literary man—even of a prose author—must be both born and made.

> 'The wife of one of our most celebrated literary men said not long ago, "It is a mistake for brainy people to marry brains, and, happily, few of them do it. Put two geniuses together in matrimony, and you have two cats in a bag—nervous, fretful creatures, with no patience and less common sense, who will be always worrying each other, and tugging in opposite directions at the matrimonial chain. What a clever man wants is a clear-headed, sensible wife, who will forget his vagaries in remembering his brilliancy, and remain a constant shield between his sensitiveness and disagreeable things; something, in fact, like one of those cushions that sailors put down the side of a vessel to keep it from jarring too roughly against the dock. Look at me, for instance. I never wrote a word for publication, painted a picture, composed music, or did anything clever in all my life; but I make my husband just the sort of wife he needs."'

* * * * *

Perhaps the most conspicuous illustration of the truth of these remarks is the case of the Carlyles. Both husband and wife were geniuses; 'they suffered in the same way from nerves disordered, digestion impaired, excessive self-consciousness, and the absence of children to take their thoughts away from each other. They were, in the fullest sense of the word, everything to each other—sole comforters, chief tormentors.' Their marital experience was 'the most turbulent, incongruous thing on earth—a mixture of honey and wormwood, the sweetest and the bitterest, or, as it were, at one time, the clearest sunshiny weather in nature, then whirlwinds and sleet and frost, the thunder and lightning and furious storms—all mingled together into the same seasons—and the sunshine always in the smallest quantity.' '*Quelle vie!*' wrote Mrs. Carlyle, 'let no woman who values peace of soul ever dream of marrying an author.' But Carlyle was not the typical author

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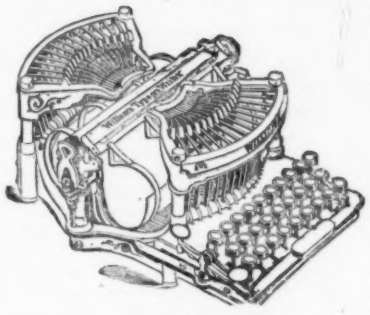

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and Mrs. Carlyle was not easy to live with. Still, Mrs. Carlyle had just reason to complain as the following incidents will show :—

'The thirteen years—1853–1865—during which "Frederick the Great" was being written, was another period of intense nervous strain and mental absorption, and the sage could not suffer the slightest interruption. The story goes that Mrs. Carlyle ventured up to the "sublime garret," where the book was composed, with her needlework one day, but before long her husband drew attention to the noise which she made with her needle. Folding her hands idly upon her lap she sat motionless; but presently the silence was broke by the voice of the philosopher: "Jane," said he, "I can hear you breathing." As Mrs. Carlyle found it inconvenient to give up this natural process, she was forced to give up all attempts at keeping her husband company in his study.'

'A lady calling one day in Cheyne Row, met Carlyle on his own doorstep, his head bent, and perplexity and annoyance wrinkling the philosophic brow. Somewhat to her surprise—for she was an intimate of the house—the sage only bowed, and went on his way down the dismal little street. The servant showed the visitor into a darkened room, where were to be seen the *débris* of tea and the prostrate form of Mrs. Carlyle on the sofa. "Did you meet Thomas?" demanded the wife, in a voice which showed unmistakable traces of a recent domestic storm. "Yes, he was going out. I met him on the doorstep looking very sad. What's the matter, my dear?" "The matter!" cried Mrs. Carlyle from the sofa with sparkling eyes; "I've been two days on this sofa with a sick headache, and he's only this instant come in and asked me what ails me! And—well I've just thrown my tea-cup at him!"'

Most people will agree with Tennyson that it was a good thing that Carlyle and Mrs. Carlyle did marry each other, for otherwise there might have been four unhappy people instead of two.

* * * * *

'Except the Newgate Calendar,' wrote dyspeptic Carlyle, 'there is no more sickening reading than the biographies of authors.' However true this may be, and the book before me goes a long way to disprove it, the love-letters, at least, of authors ought to be interesting reading. Why is it, by the way, that the world generally sees such exuberant humour in a love letter? Let counsel produce one in court and immediately his lordship, the jury, the solicitors, the ushers, the spectators, and the very policemen [stolid emblems of British inertia] put on the broadest of grins and prepare for immoderate guffaws. When the swain, like Silas Wegg, drops into poetry, the climax of hilarity is reached. The fact is, that it is difficult to write a love letter and still remain sane.

'Even so by love the young and tender wit
Is turned to folly.'

But when the manly conquers the maudlin, when there is grammar and feeling, sense and sincerity, the love letter of a distinguished writer should be the greenest leaf in his laurel crown. Unhappily we get few love letters in this book, perhaps because they are too sacred for 'daws to peck at.' One of Sir Richard Steele's is given—a masterpiece, so charmingly tender, so sweetly ardent and humorous, that I cannot refrain from quoting it here :—

'Madam,—It is the hardest thing in the world to be in love and yet attend to business. As for me, all who speak to me find me out, and I must lock myself up, or other people will do it for me. A gentleman asked me this morning, "What news from Lisbon?" and I answered, "She is exquisitely handsome!" Another desired to know when I had been last at Hampton Court. I replied, "It will be on Tuesday come se'nnight." Pr'ythee, allow me at least to kiss your hand before that day, that my mind may be in some composure. O love!

'A thousand torments dwell about me!
Yet who would live to live without thee?

'Methinks I could write a volume to you: but all the language on earth would fail in saying how much and with what disinterested passion I am ever yours, RICH. STEELE.'

* * * * *

If Steele is at the one pole, Sterne is at the other. The author of 'The Sentimental Journey' actually made the same letters do duty to two of his inamoratas. The glowing epistles he indited to Miss Lumley were sub-edited, and in a cold-blooded second edition served to stir the heart of the 'fair Bramine.' Byron was no better. Tremulous with love-lore as he was, he *copied* his effusions from 'Les Liaisons Dangereuses.' Of one of Keats' love letters, Matthew Arnold observes, 'it has in its relaxed self-abandonment something underbred and ignoble. . . . It is the love letter of a surgeon's apprentice.'

* * * * *

I cannot stay longer with this delightful book. If you desire to know how great poets and painters, musicians and divines, actors and soldiers, preachers and lawyers, scientists and politicians have comported themselves in love, buy the book and read it for yourselves. You will laugh hugely, and your friends will be fain to say your anecdotage has begun. I cannot conclude this notice, however, without snipping four capital stories—typical of dozens in this fascinating volume :—

'Professor Whewell, Master of Trinity College, Cambridge, was not distinguished for good looks. One day as he and his wife were getting into their carriage, he overheard some undergraduates remark, "There goes beauty and the beast." He turned sharply round and said, "Gentlemen, you may say what you like about me, but I won't have my wife called a beast!"'

'The wife of the late Professor Agassiz was one morning putting on her stockings and boots. A little scream attracted the Professor's attention. Not having risen, he leaned forward anxiously on his elbow and inquired what was the matter.

'"Why, a little snake has just crawled out of my boot!" cried she.

'"Only one, my dear?" interrogated the Professor, lying down again. "There should have been three."

'He had put them there to keep them warm.'

'One day Robert Lowe was criticising the Marriage Service, and especially the saying of the man—"With all my worldly goods I thee endow."

'"When I married," he remarked, 'I had nothing to give my bride.'

'"Oh, yes, Robert, you had your magnificent intellect,' suggested Mrs. Lowe.

'"My dear, I did not endow you with that."'

'It is a matter of common knowledge that Lady Beaconsfield had an inordinate admiration for her husband. She was one evening in the company of some ladies when the conversation wandered into a talk about fine figures—Mr. A's, Mr. B's, Captain C's. The old lady let them run on, and then said pityingly: "Ah! you should see my Dizzy in his bath!"'

* * * * *

Considerable interest attaches to 'Thackerayana,' which Messrs. Chatto & Windus have just re-published in a cheap and attractive edition. As is well known, the great writer was a born caricaturist. Originally intended for an artist, he never forsook the playful practice of book illustration to the day of his death. Even as a schoolboy he was wont to adorn the margins and fly-leaves of the books he read with pen and pencil drawings of exquisite humour. On his death, the volumes so illustrated were dispersed by public auction in March 1864. Subsequently the late James Camden Hotten collected a sufficient number of them and added biographical and anecdotal matter to furnish a setting for the drawings. The publication was looked upon with disfavour by the daughters of the artist, who 'regretted that it should be thought to give a fair example of his feelings for art.' Nevertheless, here the book is, a riot of pictorial joke and waggish fancy, puns in pencil, comedy in colour. 'The world which is loth to admit high excellence in more than one direction has never fitly recognised Thackeray's great gift as a comic draughtsman.' Though inferior to Hablot Browne ('Phiz'), he often equals, and sometimes surpasses, John Leech. The drawings are, of course, the great feature of the new as of the old edition. The letterpress, however, is readable from cover to cover. All lovers of '-ana'—and they still exist among the faithful remnant who have not bowed the knee to the 'boomster' novelists—will be eager to possess this work now it has come within the reach of the slender-pursed book buyer.

Messrs. Frederick Warne & Co. have sent me 'John Gilbert, Yeoman,' by R. G. Soans. It is a strong story of Commonwealth days. The book is full of good reading, though the archaic English smacks of Wardour Street, and some of the characters talk for nearly a page at a breath.

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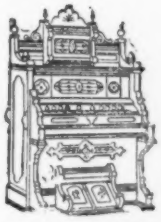

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THE EDITOR'S TABLE

BEFORE proceeding to our usual notices of new school books, we wish to offer a word of welcome to two new entrants into the field of scholastic journalism—we refer to **The School Teacher,** edited by T. B. Ellery, F.R.G.S., and **The Teachers' Review,** edited by J. E. Parrott, M.A., LL.B., each of which begins what we hope may be a prosperous career with the number for January, 1898. Both bear impress of their respective able editors, both possess features of merit which will commend them to teachers. Naturally we have no desire that a single one of the many thousand teachers whom we endeavour to help and to serve in every possible way should give up our own journal for either of the new competitors for scholastic support, but we feel justified in recommending those who can to take one or both of the new journals in addition to the **Practical Teacher.** The latter, recognising the fact that the two editors have for a long time been on its staff of contributors, can hardly help feeling a sort of parental interest in the infant monthlies, and is tempted to hail them with the familiar words, 'Bless you, my children!'

CASSELL & COMPANY, LIMITED, LONDON.

A History of England. By H. O. Arnold-Forster. In this volume the author seeks to provide a history of England for popular use. He recognises that while complete, in the sense of dealing with the whole course of our country's records, it should neither be so large nor so costly as to be beyond the means of young artisans and others who wish to make themselves acquainted with a subject of such importance. He has also endeavoured to make it interesting and easily understood, so that it may be readable and popular. To secure his object he has been careful to use simple language, to break up the chapters into short sections under separate headings often of a very striking kind, to introduce apt questions from a great variety of sources, and especially to throw light on history by reference to present customs and existing memorials of the past. This constant reference to the present in illustration of the past, and the converse reference to the past in explanation of present conditions, are among the most marked features of this admirable volume. Another special characteristic is the intensely patriotic tone which pervades the work.

The book is, perhaps, rather too large for ordinary use in a school for children, but we feel that we can strongly recommend it as suitable for the library of a young student, or for that of an intelligent working man. We must not omit to mention that in addition to its other merits it has an abundant collection of good illustrations, many of which are reproduced from paintings by eminent artists.

CHARLES AND DIBLE, LONDON.

The 'Beaumont' Geography and Map Tracing Books. Standards V. and VI. By W. Schofield, F.R.G.S. In each of these books a dozen maps are printed in a sort of red ochre tint on the right-hand pages. On the left-hand pages are arranged the chief geographical facts respecting the countries which are shown on the respective opposite pages. At the foot of each map directions are found for tracing and colouring it with crayons. As a mode of interesting children in their geography lesson, and economising the teacher's time, we think the books likely to prove decidedly useful.

The 'Beaumont' Series of Varied Occupations. Map Tracing and Colouring. Packets A to F. By W. Schofield, F.R.G.S. Packet A serves for Standards I. and II., the other five packets for the succeeding standards. Each packet contains 24 sheets of drawing paper, foolscap quarto size, with a map printed on one side in red ochre, or in some cases, in sepia tint. The maps are to be traced and coloured according to directions given at the foot. As the maps are arranged to suit the Code requirements of the different standards in geography, and the packets of 24 maps are published at sixpence each, they provide a form of varied occupation extremely useful and economical.

Messrs. Charles & Dible's specialities can be very highly recommended, and teachers will do well to see the samples briefly noted.

CHAPMAN AND HALL, LIMITED.

A Book of Studies in Plant Form and Design. By A. E. V. Lilley and W. Midgley. This volume will afford delight to the lover of artistic design as well as valuable suggestions and practical help to the student of design and the professional designer. The authors have gone direct to nature for their inspiration, and the result is a collection of beautiful illustrations reproduced from original drawings of plant forms and from photographs from nature. From the plant forms thus illustrated a great variety of charming designs is developed, and in ten chapters of letter-press a concise statement is given of the principles of design, as well as an account of the various forms of ornamental work and suggestions as to the practical application of the designs represented. The book is produced in a form of excellent taste and at a very moderate price.

An Illustrated Record of the Retrospective Exhibition held at South Kensington. 1896. By John Fisher. This handsome quarto volume forms a worthy memorial of one of the most important exhibitions of South Kensington. It consists almost entirely of a series of 156 full-page plates of art paper on which are presented in beautiful collotype illustrations, reproductions of 256 of the most successful works of artistic design by art students under the South Kensington Department. These illustrations include designs for lace, embroidery, fans, tiles, panels, and carpets, as well as studies in painting, drawing from life, and modelling. All these works gained gold or silver medals at the various exhibitions held during the ten years preceding that of the retrospective exhibition of 1896.

In a brief introduction, Mr. Fisher gives a statement of the purpose of the work, and shows what valuable service such a record may render to teachers and students in our schools of Art and Design.

THE CHURCH MISSIONARY SOCIETY, LONDON.

The Great Big World. By Agnes M. Batty, illustrated by Lillian Stevenson. The sub-title of this attractive oblong quarto volume is 'A Missionary Walk in the Zoo.' It is made to serve the twofold purpose of describing a visit to the Zoological Gardens and the principal animals to be seen there; and interesting children in the people of the different lands from which the animals come. By means of a simple, pleasant, and familiar style the young readers are led to feel interest also in the missionary efforts made to Christianise the distant countries in which heathenism prevails.

The illustrations, many of which are in black and red, as well as black and white, are strikingly artistic. The volume would form a handsome Sunday school prize.

C. J. CLAY AND SONS, LONDON.

Two Essays on William Pitt, Earl of Chatham. By Thomas Babington Macaulay, edited with Introduction and Notes by Arthur D. Innes, M.A. It is a treat to read again the brilliant sentences of Lord Macaulay, with their glowing rhetoric, their striking antitheses, and their somewhat too evident art; but the profit is all the greater, and the pleasure is none the less to read them under the able guidance of so watchful and well-informed a tutor as Mr. Innes. The Introduction to this volume, appropriately included in the **Pitt Press Series,** contains much discriminating criticism in brief space, and the Notes not only throw abundant light on the many allusions in the essays, but serve to correct the mistaken impressions that may arise from implicit confidence in a great writer who, writing on subjects in which he took a lively interest, could not do so with perfect impartiality. The book is extremely well edited, and is produced in a manner which reflects credit on the Cambridge University Press.

The Smaller Cambridge Bible for Schools: Ezra and Nehemiah. By Herbert Edward Ryle, D.D. This small volume contains besides the text of the two prophetical books, a condensation of the Introduction and Notes given by Professor Ryle in the larger edition issued as part of the Cambridge Bible for Schools and Colleges. The editor has been helped in the work of abridgment by Miss Mary Dyson Hort, to whom, in a brief prefatory note, he acknowledges his indebtedness for the skill and patience with which she has accomplished her share of the task. The Introduction contains much critical information, and the Notes explanatory and elucidatory are quite ample for use in schools, and for young students generally.

W. B. CLIVE, U.C.C. PRESS.

Exercises and Test Questions on the Tutorial Latin Grammar. By F. L. D. Richardson, B.A., and A. E. W. Hazel, LL.D., M.A., B.C.L. In this book it is assumed that the Accidence only has been studied. The rules of syntax required in working the exercises are therefore given. In addition to a very copious collection of exercises arranged according to the sections of the text-book, and complete vocabularies, we have a set of twenty test examination papers. The volume must be regarded as an almost essential companion to the grammar.

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Vergil: Æneid, Book I. Edited by A. H. Allcroft, M.A., and W. F. Mason, M.A. Also **Book II.**, edited by A. H. Allcroft, and A. E. W. Hazel, LL.D., etc. It is necessary only to mention these volumes in the capital series of annotated classics issued from the University Correspondence College Press. Each contains a compact introduction, a carefully printed text, and an ample body of brief notes.

GEORGE GILL AND SONS, LONDON.

Gill's Outlines and Dates of English History. This outline of English history extends from the earliest historic times to the year 1897. It professes to be no more than a framework on which the history of our country may be built; but as an outline it is remarkably full, and is thus adapted for use with any good text-book. The many facts are so arranged as to show their interdependence, and this makes the book all the more valuable as a guide in reading, and also as a help to memory in revisal. The volume is carefully printed, is illustrated by a number of useful coloured maps, and is very neatly got up.

Shakespeare's Hamlet, with Introduction and Notes. By the Rev. F. Marshall, M.A. This edition of the great dramatist's wonderful philosophical tragedy is intended for students preparing for the Oxford and Cambridge local and other similar examinations. It is arranged on a somewhat novel plan; the introduction is short but full of points of interest. The text is printed with very brief marginal notes to explain the difficult or unusual words, and occasional foot-notes supplying short paraphrases of passages which may be obscure to the young reader. This is intended to facilitate intelligent reading in class, without the interruption of turning to explanations at the end of the book. In a further section of the book, however, are to be found additional notes to help in more thorough study of the matter and language of the play. The characters are fully discussed, and this is done so skilfully, as to give really valuable help to the student. We have been particularly struck by the way in which the editor treats the question whether Hamlet was really mad or not. Excellent notes are given on the versification, grammatical difficulties, and classical allusions; and a capital glossary is followed by some two hundred examination questions for practice. We can heartily recommend this little work.

HACHETTE ET CIE., PARIS AND LONDON.

Last year we drew attention in the most favourable terms to Messrs. Hachette's *Livres d'Etrennes*. Of the exceedingly pretty volumes before us we select the following for notice this month.

Mon Journal, 1896–97. This is the bound volume for twelve months of a really excellent children's magazine in French. It contains a number of serial stories, short stories, articles on useful topics, poems, and above all a perfect wealth of coloured illustrations. We are not aware of the existence of any cheap weekly publication in England so remarkably well illustrated. As a gift for a child who can read French the volume may be strongly recommended.

Le Journal de la Jeunesse, 1897. Deuxième Semestre. This handsome volume contains the weekly numbers of an admirable illustrated weekly magazine in French for the second half of the past year. The contents are suitable for young people just beyond ordinary school age. There are several serial stories likely to interest young readers; also short stories, and many articles, in series and separate, dealing with subjects of current interest. We may name a series on cycling, 'La Bicyclette'; another on 'Excursions de Vacances'; another, 'Les Progres de la Grande-Bretagne depuis Soixante Ans'; and 'Lettres du Regiment.' The book is capitally printed, and profusely illustrated with really excellent specimens of black and white process work.

W. AND A. K. JOHNSTON, EDINBURGH.

New Map of Africa. This map is an excellent production, and is a credit to the well-known firm of map engravers. It will serve equally well as a reference map for the study, or as a map for educational purposes, for its details can be well seen by a large class. These two purposes are not always combined in the same map, in fact, it is seldom that we find them together. The scale is large enough to be of good service, and yet not so large as to be cumbersome. The physical features are clearly portrayed; rivers, lakes and mountains being almost as distinct as if the map had been devoted to physical features only.

But the main value of the map lies on the political side, and the publishers have put both the general reader and the student alike under an obligation by giving us a map of Africa up to date. Events have moved with great rapidity in this continent during the last decade, and the delimitation of such territories as the Congo Free State is a matter of comparatively ancient history. The map before us indicates clearly such recent changes as the separation of British Bechuanaland from the Bechuanaland Protectorate, the absorption of Swaziland by the Transvaal Republic, the formation of Nyassaland into a separate protectorate from Rhodesia, the withdrawal of Italy from Abyssinia, the tremendous extension of French influence in West Africa, and the incorporation of the kingdoms of Sokoto, Gando, Bornu, Borgu, Adamawa and Ilorin with the Niger territories. It also shows the regions yet to be delimited, where the race between the English and French is at this moment taking place.

The colouring is artistic and attractive, and the population of the towns is indicated by special signs. We feel certain that this map will be highly serviceable both in schools and colleges.

METHUEN AND CO., LONDON.

A Primer of Wordsworth. By Laurie Magnus, B.A. A well-written biography occupies the first fifty pages or thereabouts of this volume. The succeeding chapters treat of the Longer Poems, the Shorter Poems, Memorials of Tours, the Sonnets, and the Prose Works of Wordsworth. All these are the subjects of critical analysis and comment, with illustrative quotations and other helps for the student; and the whole concludes with 'A Critical Essay,' in which—as, indeed, throughout the book—the author shows true insight and genuine appreciation of the great poet, whom he regards in the threefold aspect of teacher, poet, and priest. A full Bibliography, with dates, is appended.

A Primer of the Bible. By W. H. Bennett, M.A. It must not be supposed from the title that this book is an elementary manual of Scripture teaching; it is rather an introduction to a critical study of the Bible. Thus it gives details of the history, so far as it is known, of the various books of the Bible—of their composition, 'their relations to one another, to the history of Israel, of Judaism, and of the Church, and the process by which they were chosen, collected, and set apart as Sacred Scriptures.' The work thus includes a wide range of topics, and is based on extensive reading and collation of authors. In brief space and in suitable form, it appears to us to place before the young student the results of recent criticism. The chapters which deal with the Johannine Literature, the Formation of the Christian Bible, and the Protestant Bibles are particularly interesting.

THOS. NELSON AND SONS, LONDON.

A Book about Shakespeare. By J. N. M'Ilwraith. We have here a really charming book, 'written for young people' with so much insight, and such a bright pleasant style, that we can imagine no more suitable means of introducing boys and girls to the study of the life and times of Shakespeare. From the first chapter, entitled 'When Shakespeare was a Boy,' to the last on 'Stratford-on-Avon To-day,' the volume abounds in interest, and we are not only made familiar with the life in which the great poet must have taken part, but we have very skilful but brief analyses of many of his most famous plays. The plays are illustrated by some very pretty drawings in outline, and numerous other illustrations present to us views in Stratford and the neighbourhood. The book is very suitable for a school prize, or for the school library.

RELFE BROTHERS, LONDON.

First Year of Scientific Knowledge. By Paul Bert. Just as we are going to press comes to hand the revised edition of this really admirable introduction to Natural Science. The translation made by Madame Paul Bert from the French of her eminent husband has been thoroughly revised, partly re-written, and considerably enlarged by Richard Wormwell, D.Sc., M.A., and Montagu Lubbock, M.D. of London and Paris. We have neither time nor space to give at present an adequate notice of this valuable class book, but we hope to be able to do it full justice next month.

WESTMINSTER SCHOOL BOOK DEPOT, LONDON.

School Organisation, Hygiene, and Discipline. By Joseph H. Cowham. The fact that this work has already gone into a fourth edition relieves us from any need of describing its general merits, or analysing its contents. The present edition, however, contains one new feature, which deserves special attention. After appendices, which embody the recent changes made by circulars of the Education Department, we find a further added section on 'School Ethics.' It treats in a very practical and rational way of all those points which are raised in the paragraph of the Code respecting the importance of training the children to good habits. The practical questions are discussed simply and clearly in relation to the ethical theories of motives and actions. The book will now be more useful than ever as affording the student a complete course of preparation in the various branches of school management.

We learn that Messrs. Chapman and Hall have just ready for publication an important work by Mr. Alfred Thomas Story on 'The Building of the Empire—the Story of England's Growth from Elizabeth to Victoria.' This book is not, as might be supposed, after the great crop of Jubilee publications, a mere *livre d'occasion* hastily compiled in commemoration of our Queen's long reign. The author has been engaged on it for several years. It will appear in two volumes copiously illustrated.

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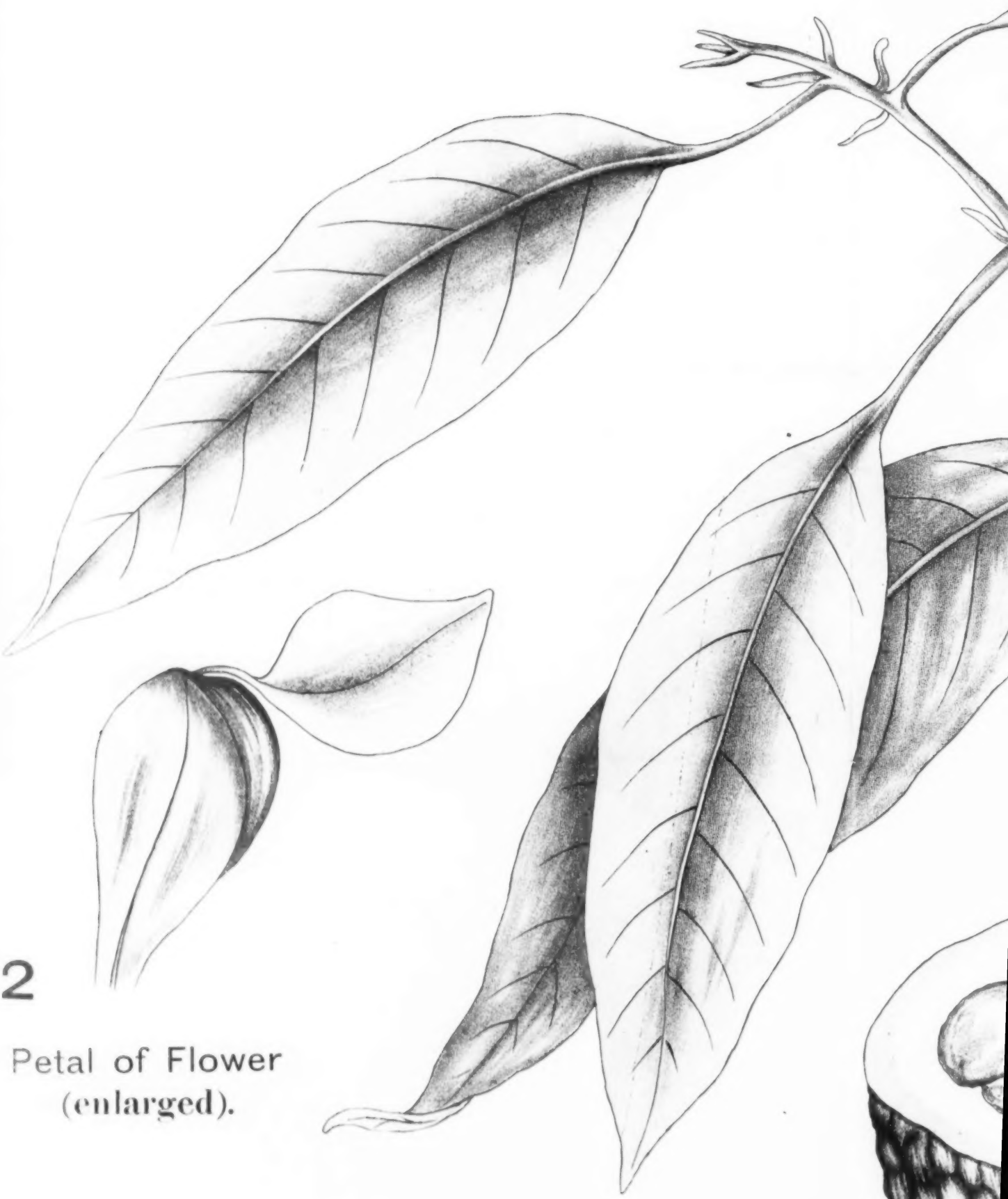
1

Cacao or Cocoa Tree (*Theobroma cacao*): **branch with fl**

Height of tree, 15 to 16 feet.

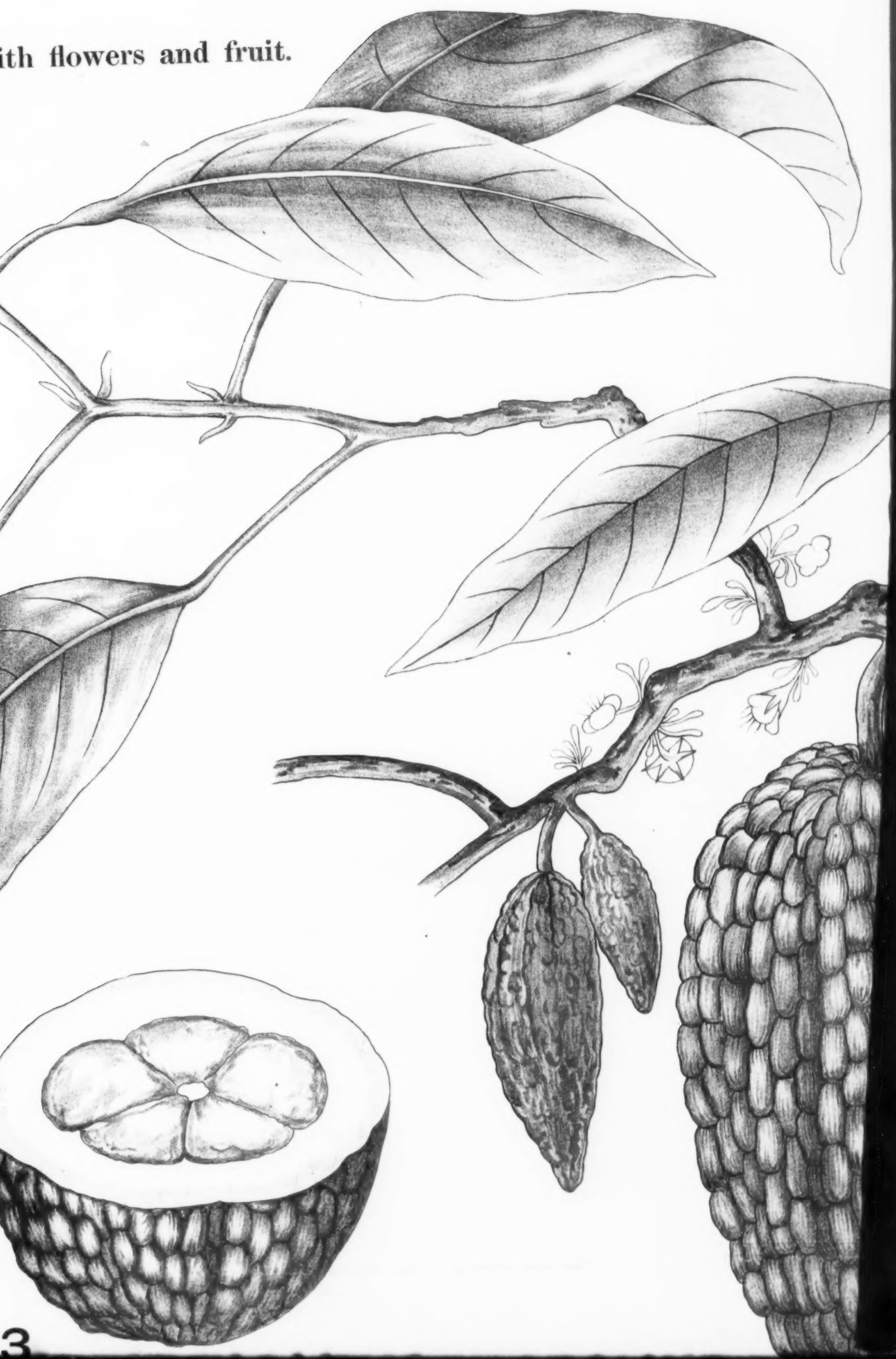


2

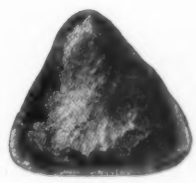
Petal of Flower
(enlarged).

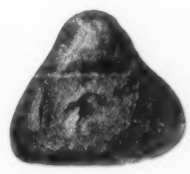
3

ith flowers and fruit.

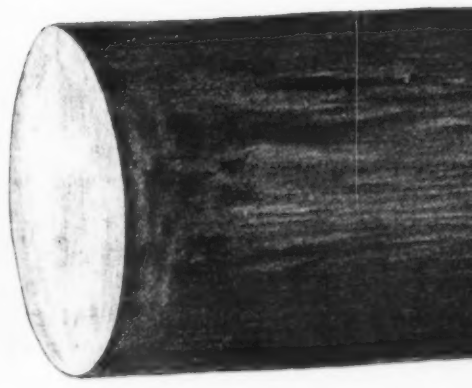


11 Cocoa Ca

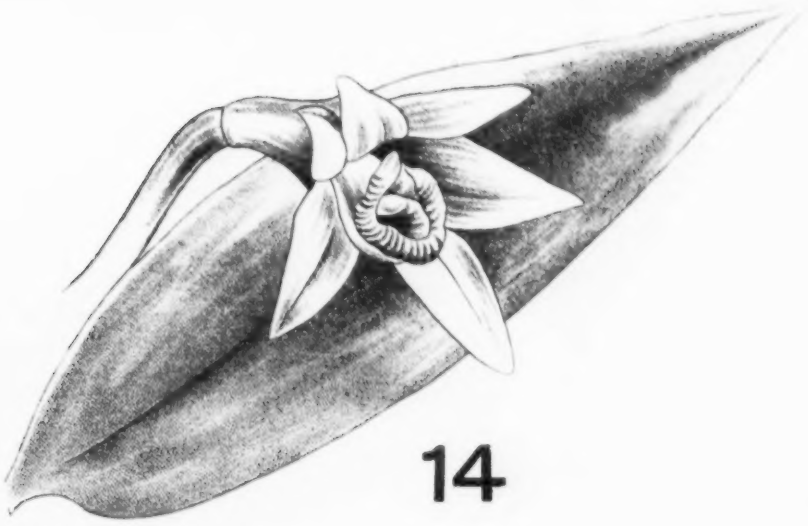




12 Chocola



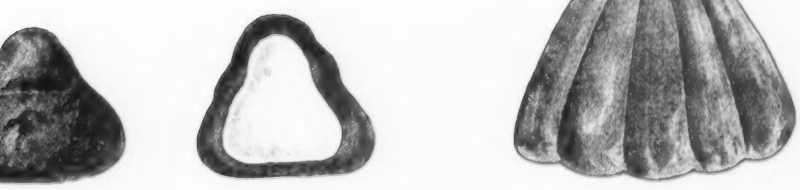
13 Cylindrical Choc



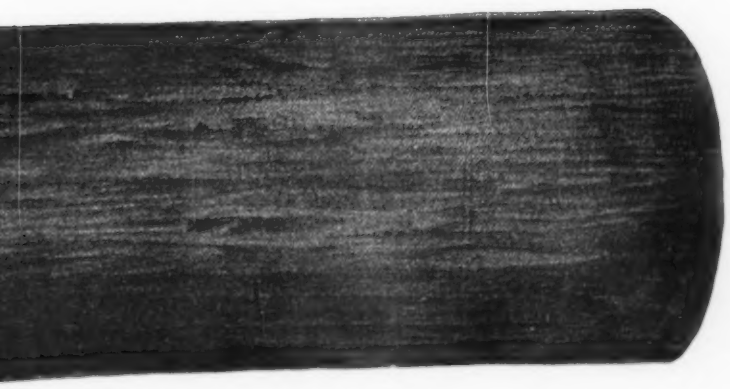
14

Vanilla (*Vanilla planifolia*):
flower and leaf.

coa Cake.



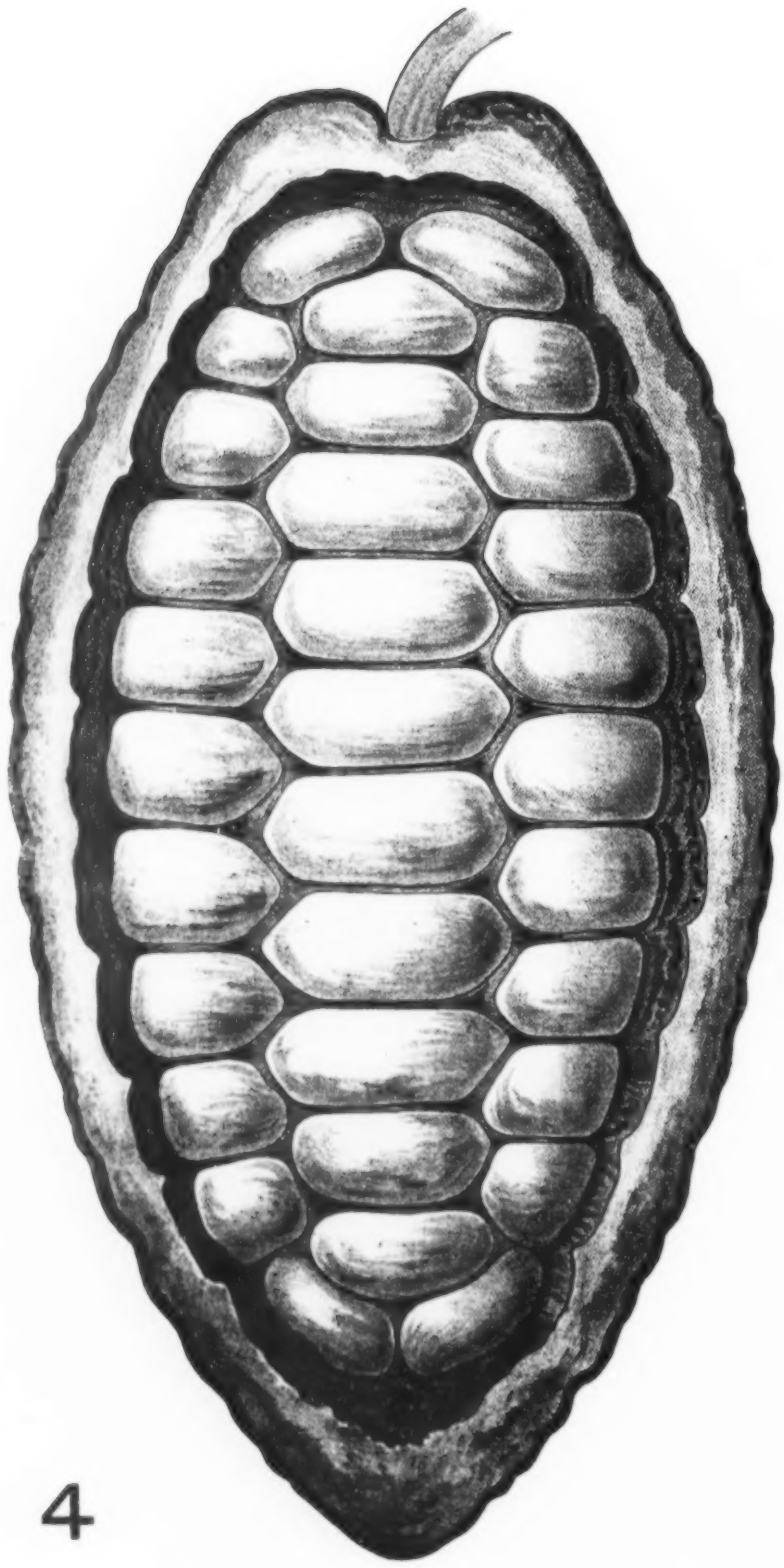
hocolate Creams.



Chocolate (Central America).

3

Fruit



4

Ripe Fruit (*longitudinal section*).

5

Seeds in Hu

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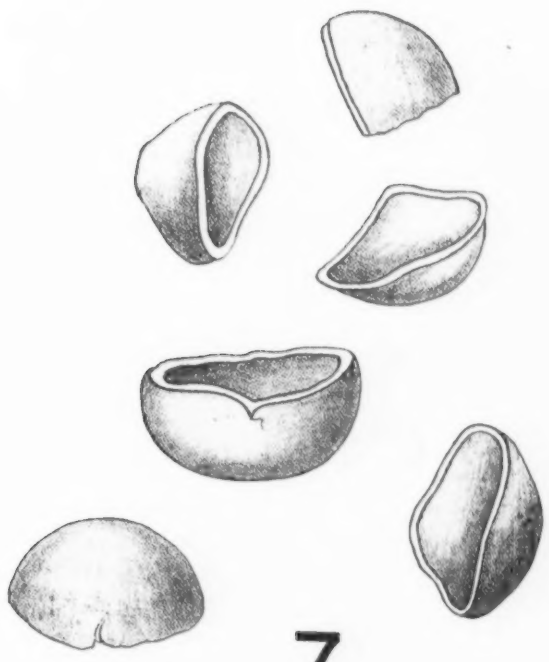
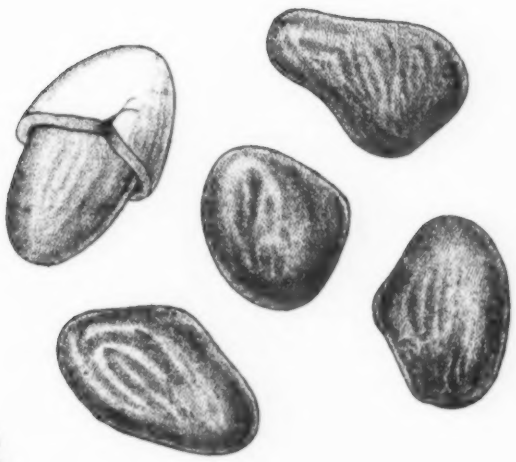
Fruit (*transverse section*).

s in Husk.



7

Cocoa Husks (sold as *miserables*).



6

Naked Seeds.

9

Cocoa Fat

CHER,

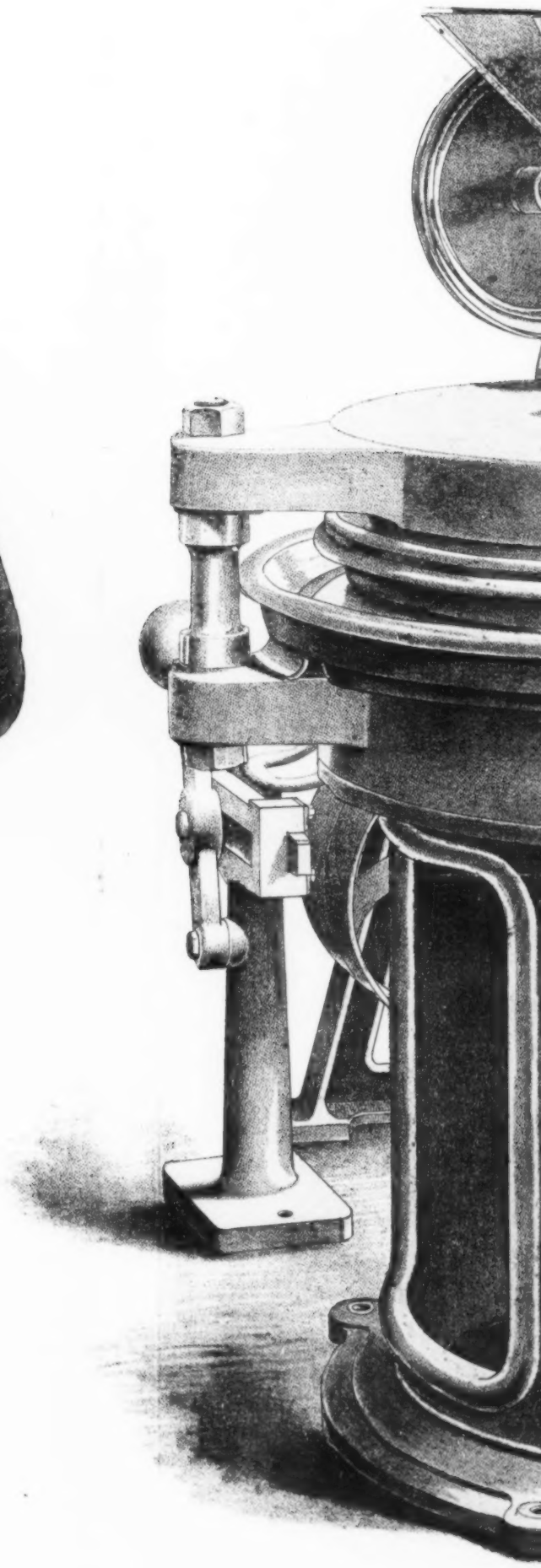
COCOA & C

13 Cylindrical Choc

8 Cocoa Paste.

les).

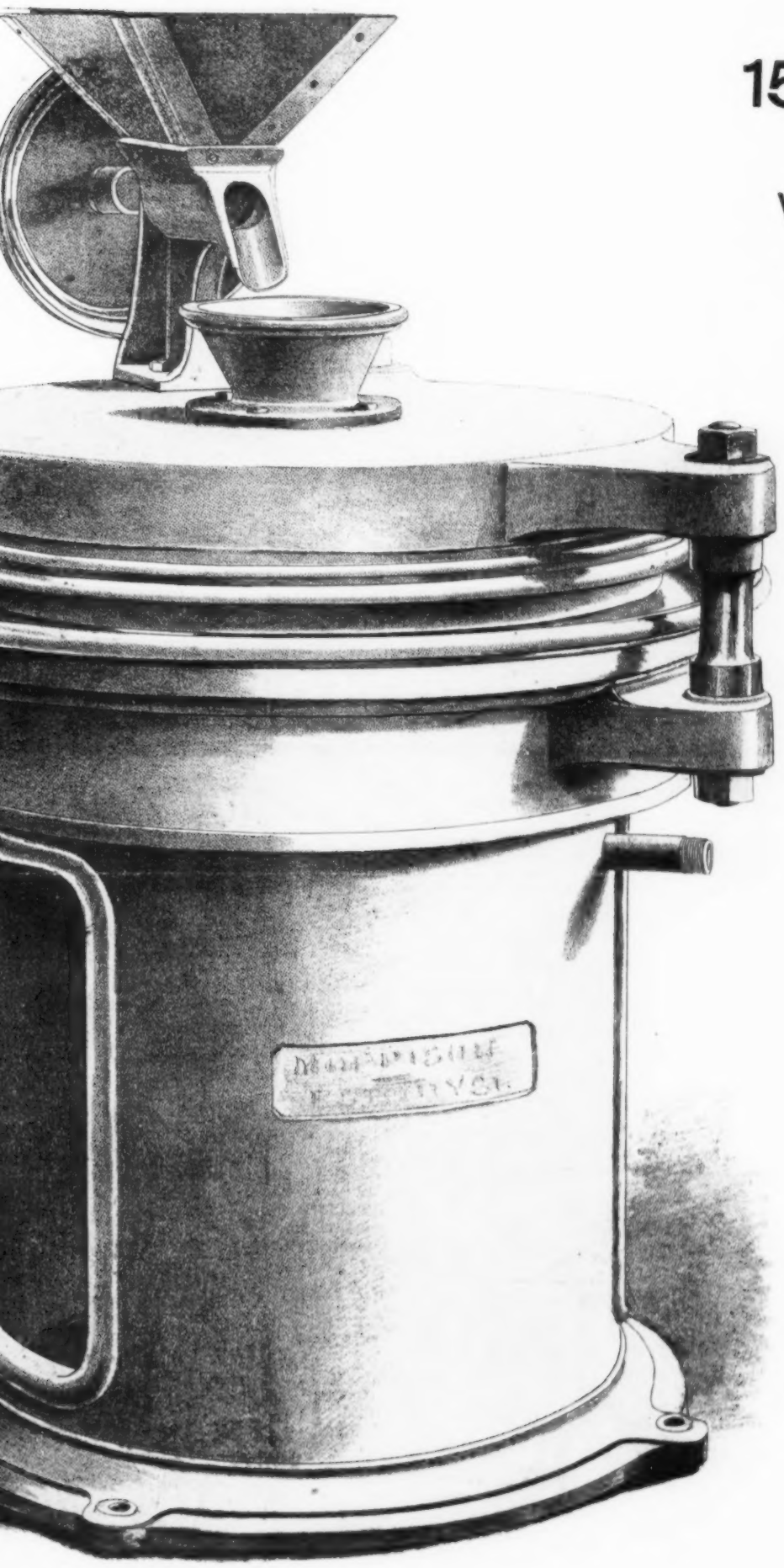
Fat or Butter.



10 Cocoa Bea

CHOCOLATE.

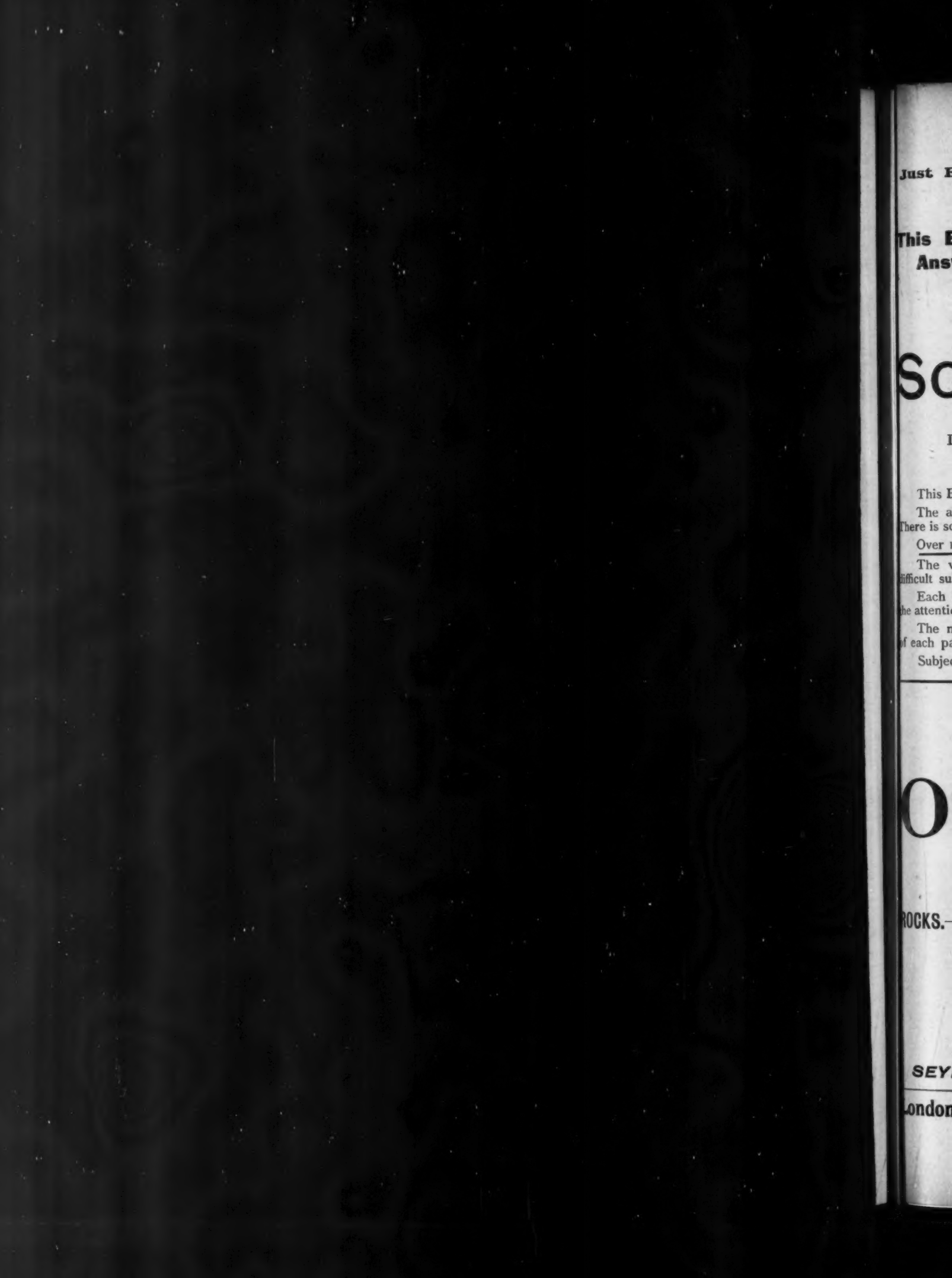
Chocolate (Central America).



15

Vanilla Pod, used for flavouring chocolate

ba Bean Grinding-mill (reduced).



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